

SPROG DCC

SPROG II DCC Decoder Programmer User Guide For use with DecoderPro Version 2.1.7



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Introduction

SPROG II is a DCC decoder programmer for connection to the USB port of a personal computer or similar device. SPROG II is supported by DecoderPro and PanelPro, both part of the JMRI project (<http://jmri.sourceforge.net/>) which, by use of the java programming language, allows platform independent support of a wide range of DCC hardware. JMRI is shareware available as a free download.

SPROG II is also capable of operating a small layout using the features of DecoderPro and PanelPro. A larger layout can be driven by using an external booster.

Requirements

- Java programming language JRE from Sun Microsystems <http://java.sun.com>
- DecoderPro from <http://jmri.sourceforge.net/>
- Regulated DC Power Supply (see Table 1)
- Short length or small oval of track for programming and/or test running

Features

- Programs virtually **all** NMRA compliant DCC decoders
- No extra hardware required for programming sound decoders (e.g. QSI, Soundtraxx)
- Easy to use graphical interface with DecoderPro
- USB interface for easy connection to PC
- USB activity LED shows communication with the PC
- Power LED flashes when programming track power is live

Specification/Operating Conditions

Parameter	Minimum	Nominal	Maximum	Units	Note
DC Input supply voltage	10V		15V	V	1
Vin supply current – not programming		50		mA	
Vin supply current – programming		300		mA	2
Vin supply current – Operating Layout			1	A	3
Operating Temperature Range		25		°C	
Output Load - programming			250	mA	2
Output Load – Operating Layout			1	A	3

Notes:

1. Minimum supply voltage depends upon the requirements of the decoder being programmed. In general it is safer to use as low a voltage as possible in case of problems with a newly installed decoder.
2. SPROG II will remove track power if output current exceeds 250mA as measured 100ms after applying power. Surge current during decoder power-up may be considerably greater than this.
3. Depends upon required DCC current.
4. SPROG II is protected against reverse polarity connection of the power supply but will not work unless the polarity is correct.

! SPROG II is not protected against track and power connections being interchanged.

Table 1 Specification/Operating Conditions

Installation

The following steps are required to install SPROG II before you can use it for the first time:

- Install the Java Runtime Environment (JRE)
- Install DecoderPro 2.1.7 or later
- Connect the Power Supply
- Install SPROG II USB drivers
- Edit DecoderPro preferences
- Connect the Programming Track

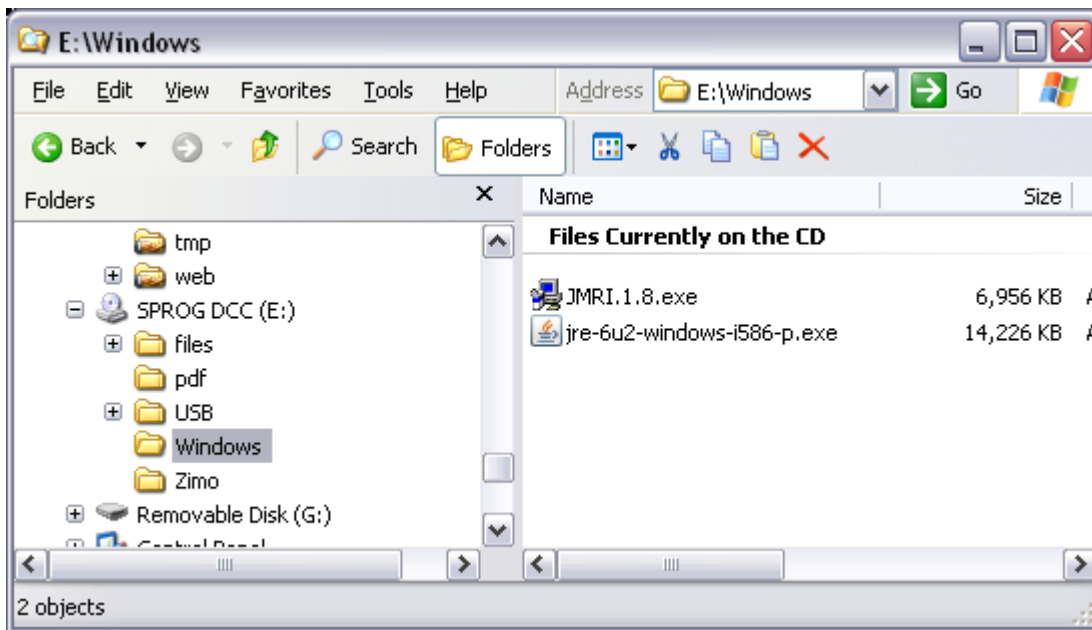
! For a successful installation, the JRE must be installed before DecoderPro is installed.

This document gives brief installation instructions for the Windows Operating System. For full instructions and for instructions to install the JRE and DecoderPro on Linux or MACOS, please refer to the Install Guides on the JMRI website at <http://jmri.sourceforge.net/download>

Install the Java Runtime Environment (JRE)

The Java Runtime Environment is not required for MACOS, which has Java support as standard. For Windows and Linux it must be installed first, either from the CD-ROM supplied or from a downloaded copy.

To install from the CD-ROM, use “My Computer” or “Windows Explorer” to browse to the directory on the CD-ROM specific to your operating system.



Double click the j2re executable file and follow the on-screen instructions to install.

Install DecoderPro

DecoderPro should then be installed from the CD-ROM or a downloaded copy. A newer version of DecoderPro than that supplied on the CD-ROM may be available from the JMRI download page

<http://jmri.sourceforge.net/download>

This user guide assumes you are using version 2.1.7, or later..

To install from the CD-ROM, browse to the directory specific to your operating system (as per the previous step). Double click on the JMRI.2.x.exe file and follow the on-screen instructions to install.

Connect the Power Supply

Power supplies sold by SPROG DCC are supplied with a circular DC jack plug. This should be removed to allow connection to the pluggable terminal block:

- Cut off the DC plug
- Separate the two conductors for about 3cm
- Strip 6-8mm of insulation from each conductor and twist the copper cores of each conductor together
- Insert the conductor marked with a white stripe in the +V terminal and

tighten the screw

- Insert the other conductor in the 0V terminal and tighten the screw

SPROG II is protected against reverse polarity connection of the power supply but will not work unless the polarity is correct.

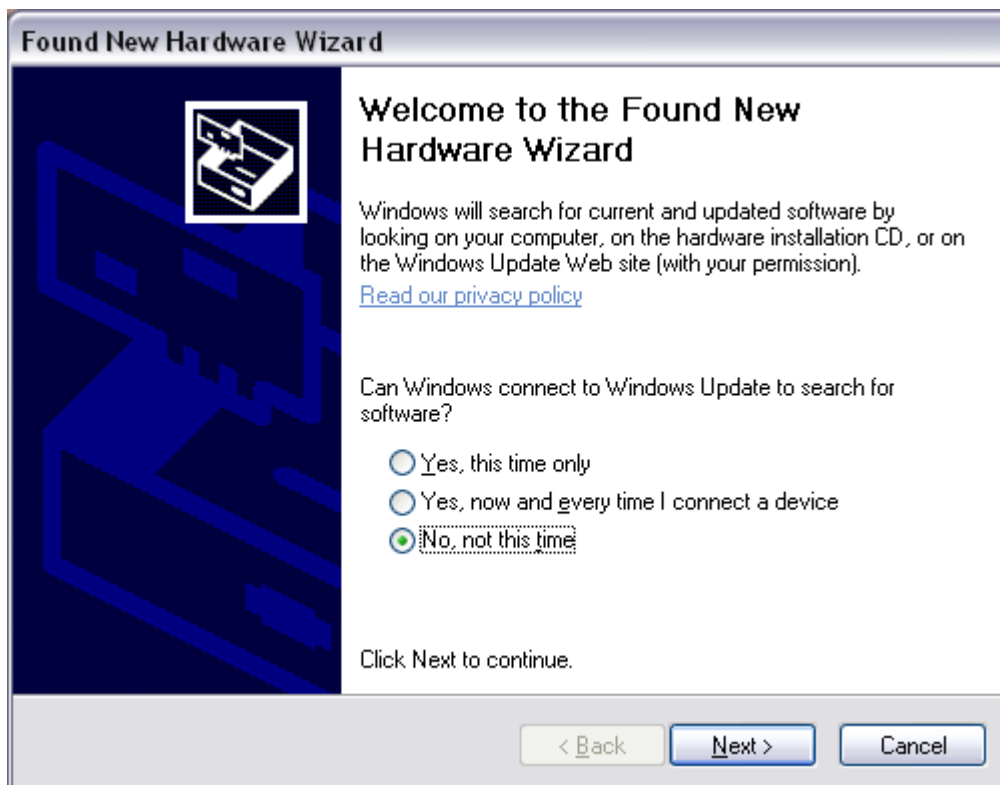
The power LED will illuminate steadily when the SPROG II is powered up and the USB connected to the host computer (next step).

The power LED will flash when the programming track is powered up.

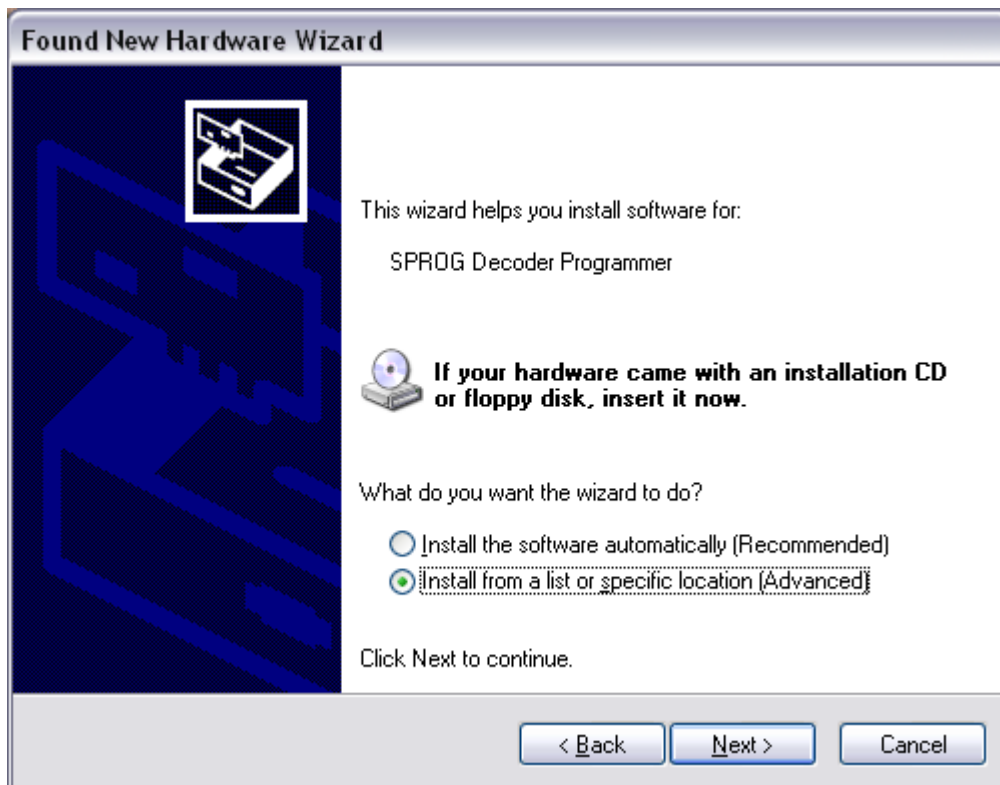
Install SPROG II USB drivers

Use the supplied USB cable to connect SPROG II to the host computer. The power LED should be lit. The first time you do this you will see the “Found new Hardware Wizard”. Follow the steps below to install the SPROG II drivers and then the USB Serial port drivers.

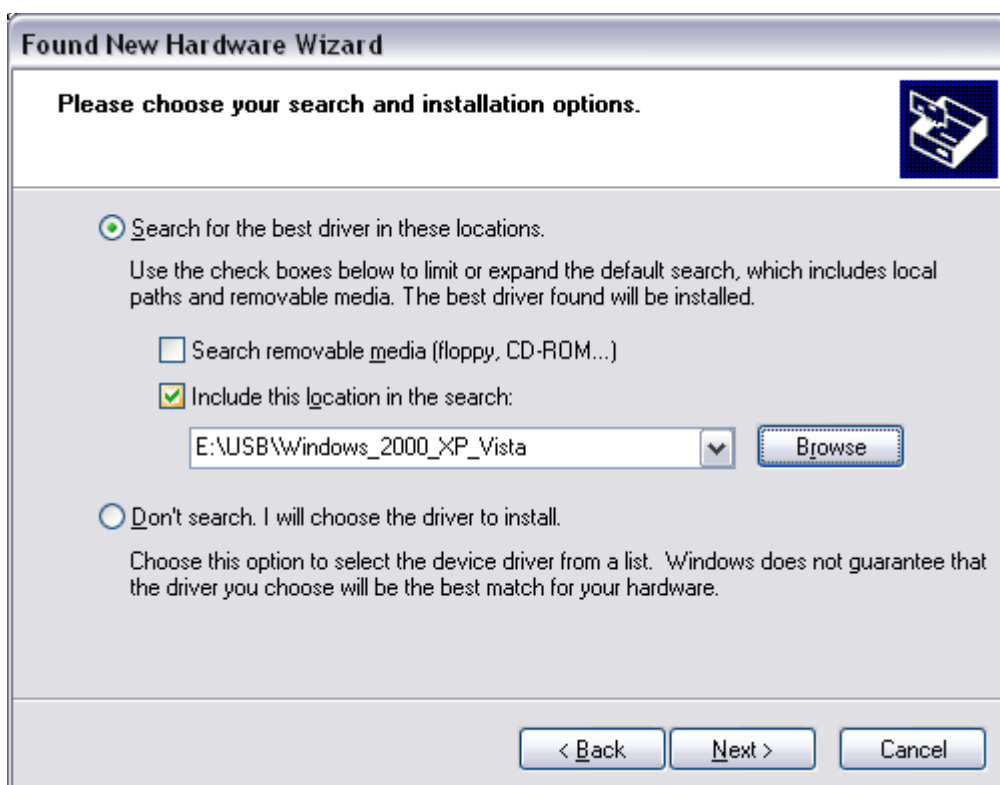
USB Drivers



Click “No, not this time” then “Next >”.



Click “Install from a list or specific location” then “Next >”.

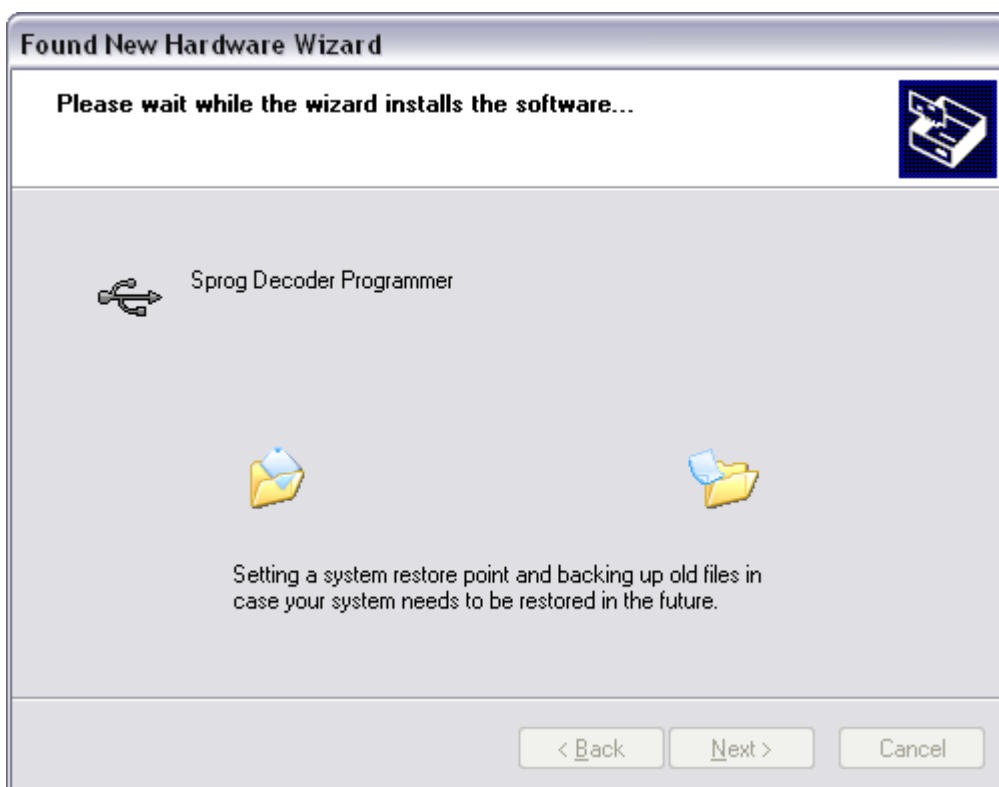


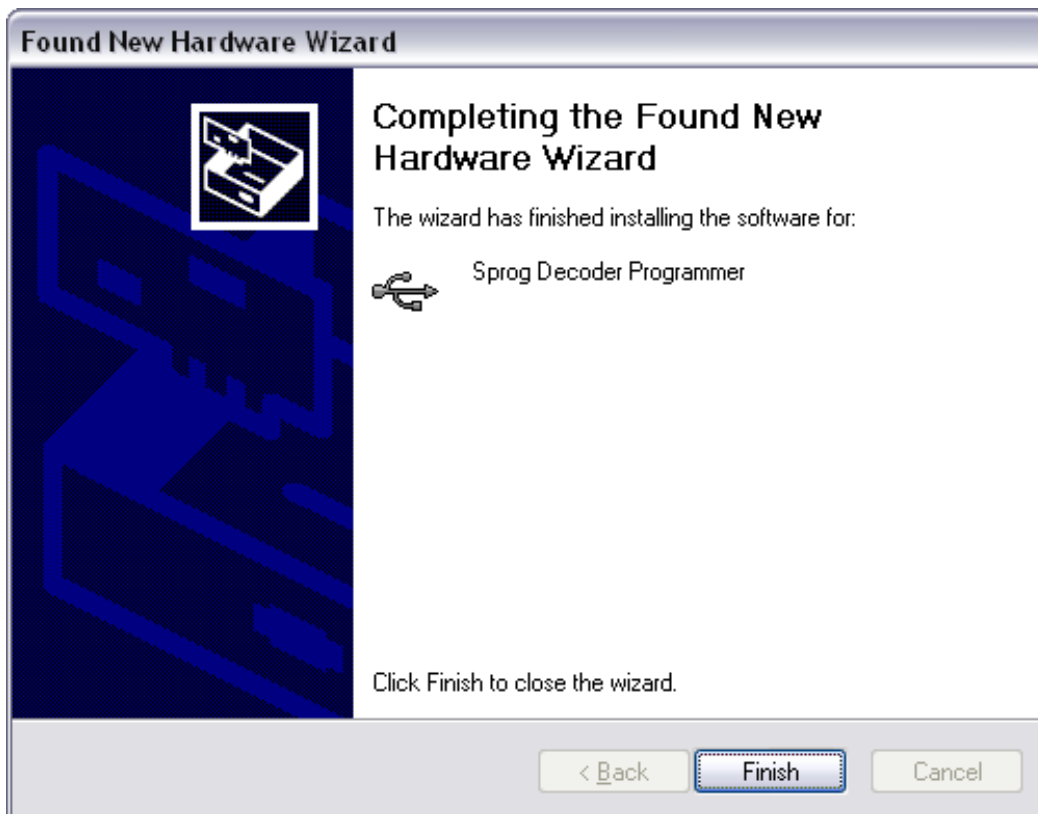
Click “Search for the best driver in these locations” then “Include this location

in the search” and then click the Browse button to find the driver directory on the CD-ROM supplied with SPROG II. Click “Next >”.



The base drivers are fully compatible with WindowsXP. To make them SPROG II specific, the .inf files are edited which, unfortunately, causes this dialogue to appear. Click “Continue Anyway”.



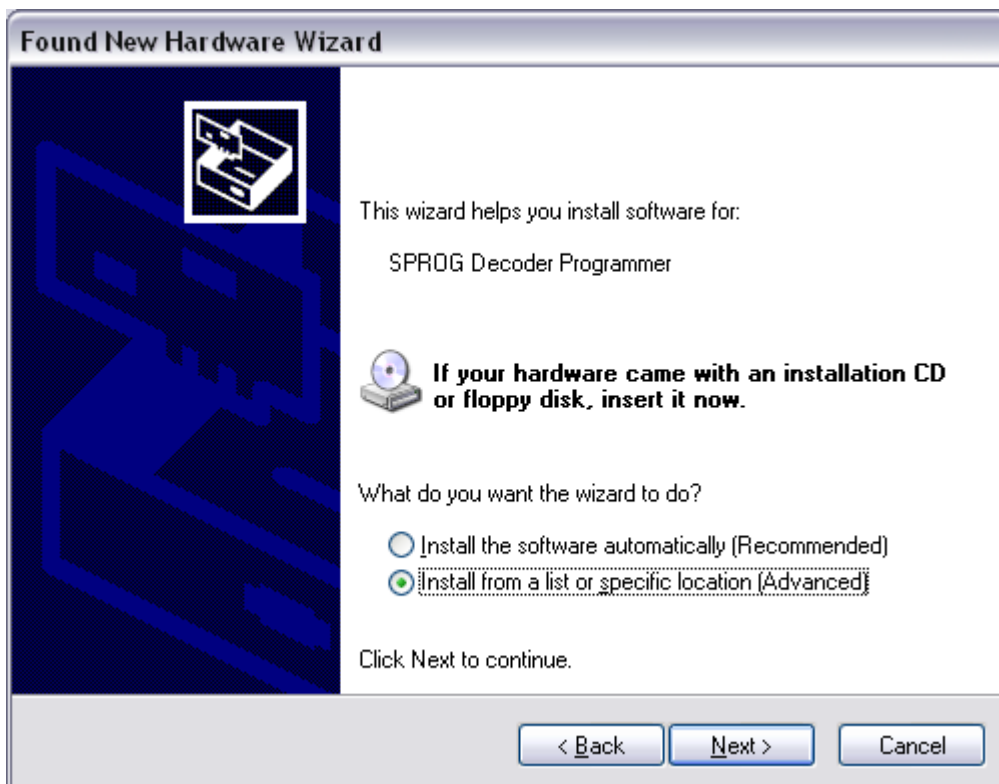


Click "Finish". You will now see a second "Found New Hardware Wizard". This is correct, and will install the required USB to Serial drivers. Do not cancel this next sequence!"

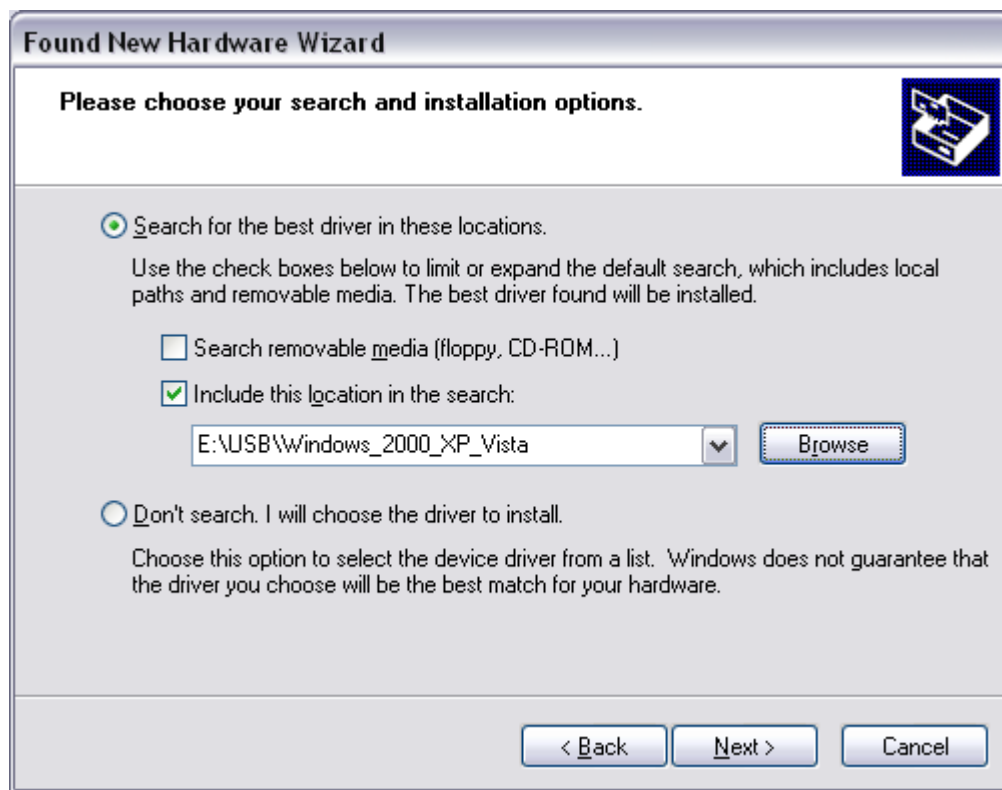
USB Serial Port Drivers



Click “No, not this time” then “Next >”



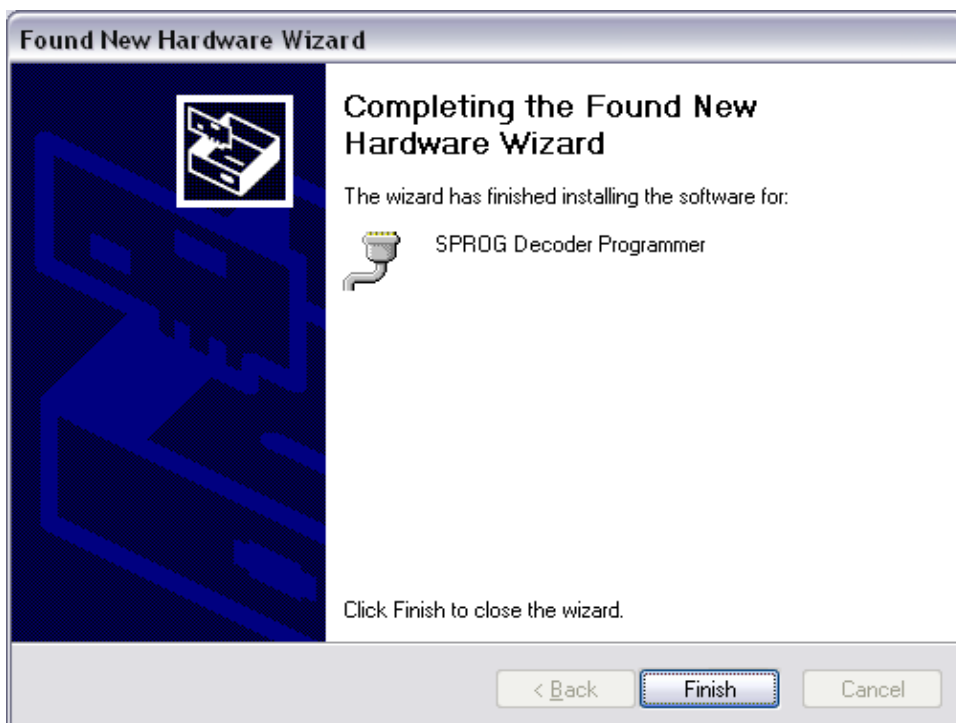
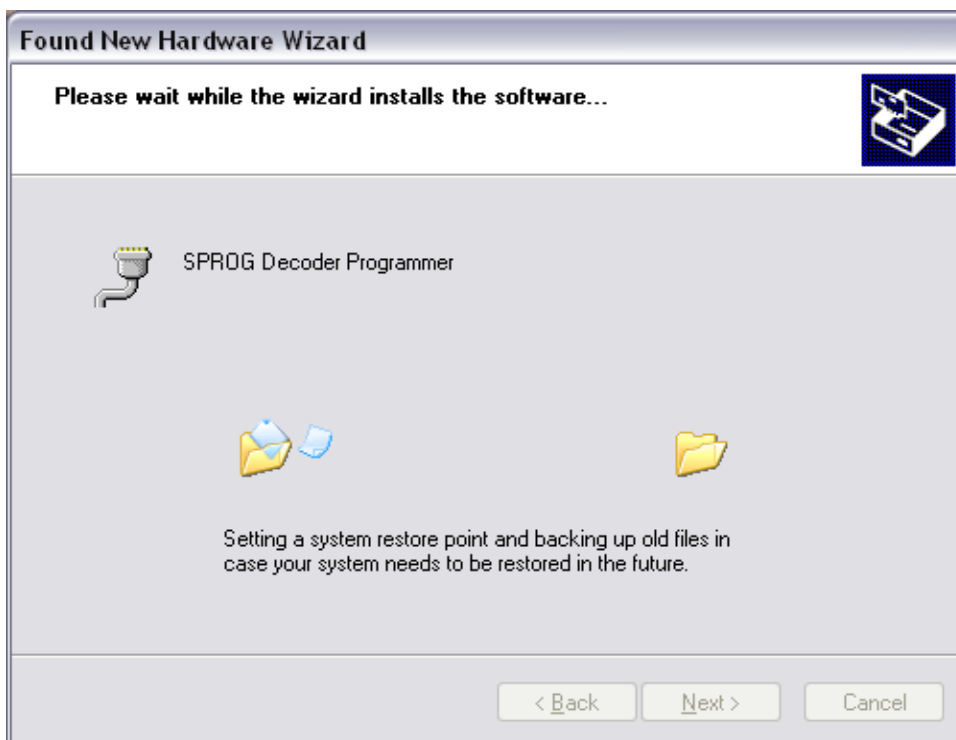
Click “Install from a list or specific location” then “Next >”



Click “Search for the best driver in these locations” then “Include this location in the search” and then Browse to find the driver directory on the CD-ROM supplied with SPROG II. Click “Next >”



Click “Continue Anyway”



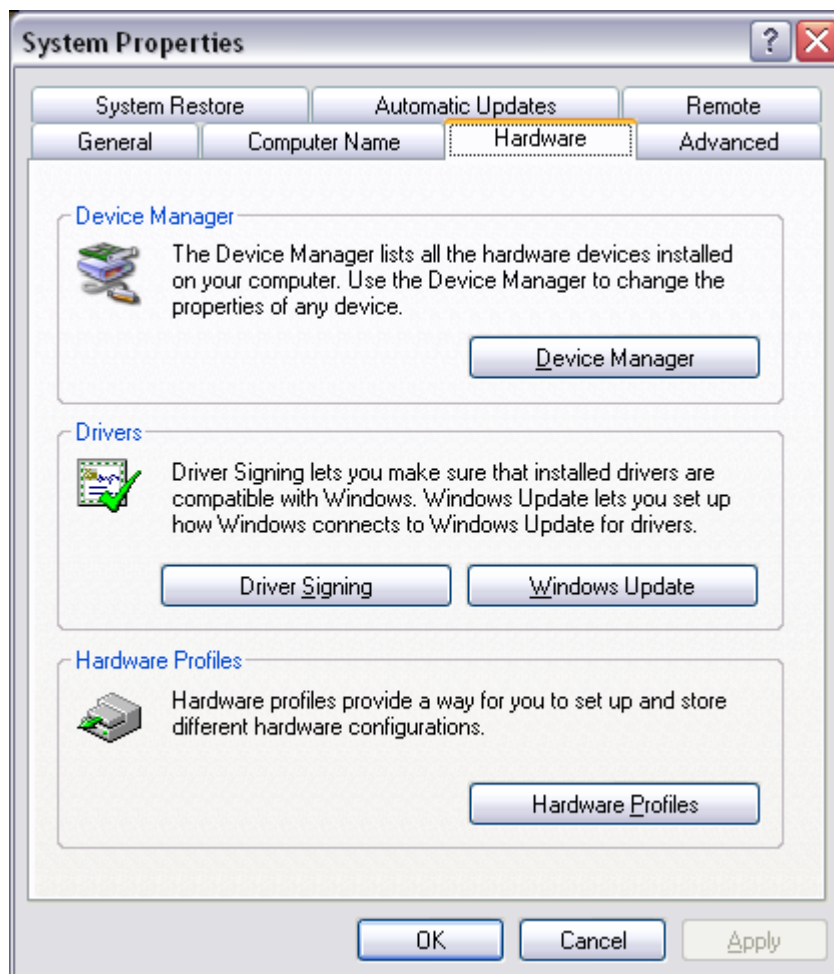
Click “Finish”

Edit DecoderPro Preferences

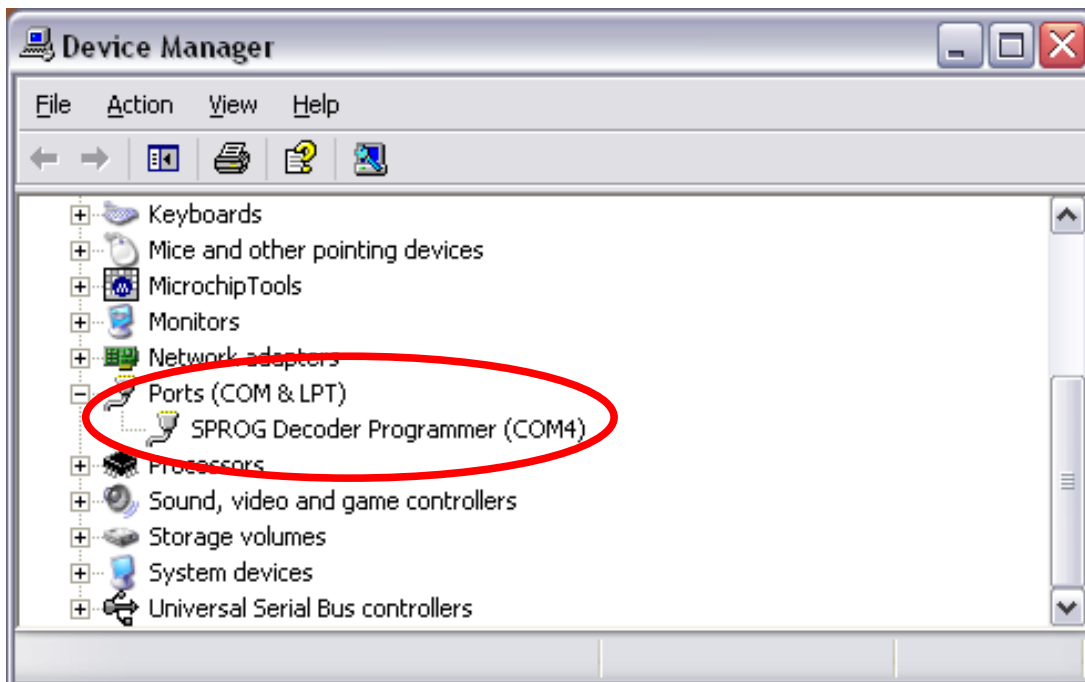
The next step is to the DecoderPro preferences in order to allow the software to connect to the SPROG II.

First you must ascertain which COM port was assigned to SPROG II during the driver installation. Open the System Properties from the Windows Control Panel (you may need to switch to classic view in Control Panel). Alternatively, right click on the Desktop “My Computer” Icon and select Properties.

Select the Hardware tab:

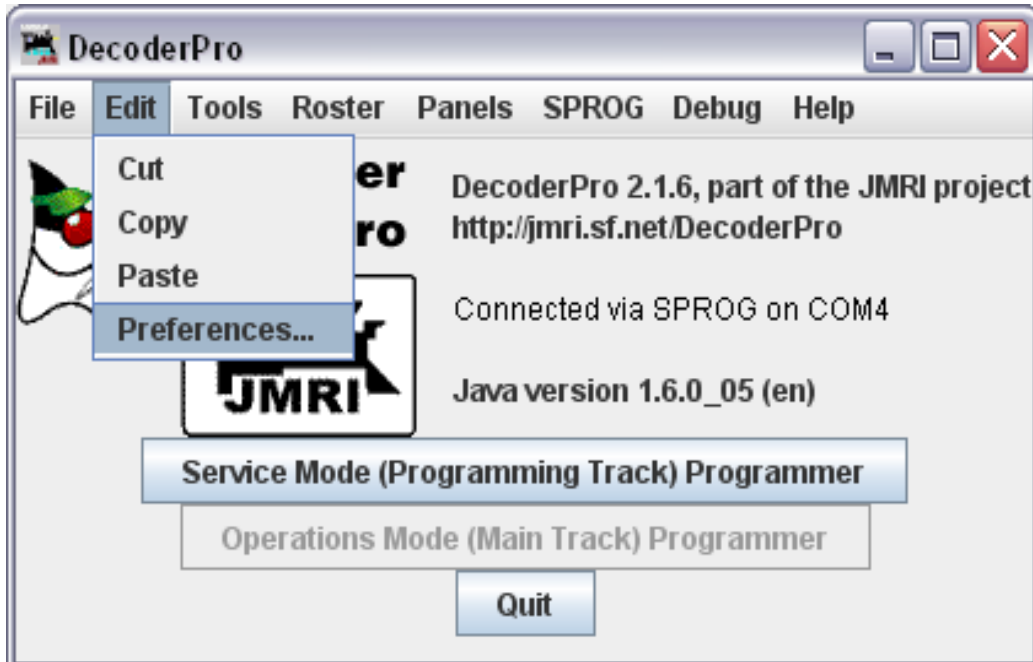


Click “Device Manager”

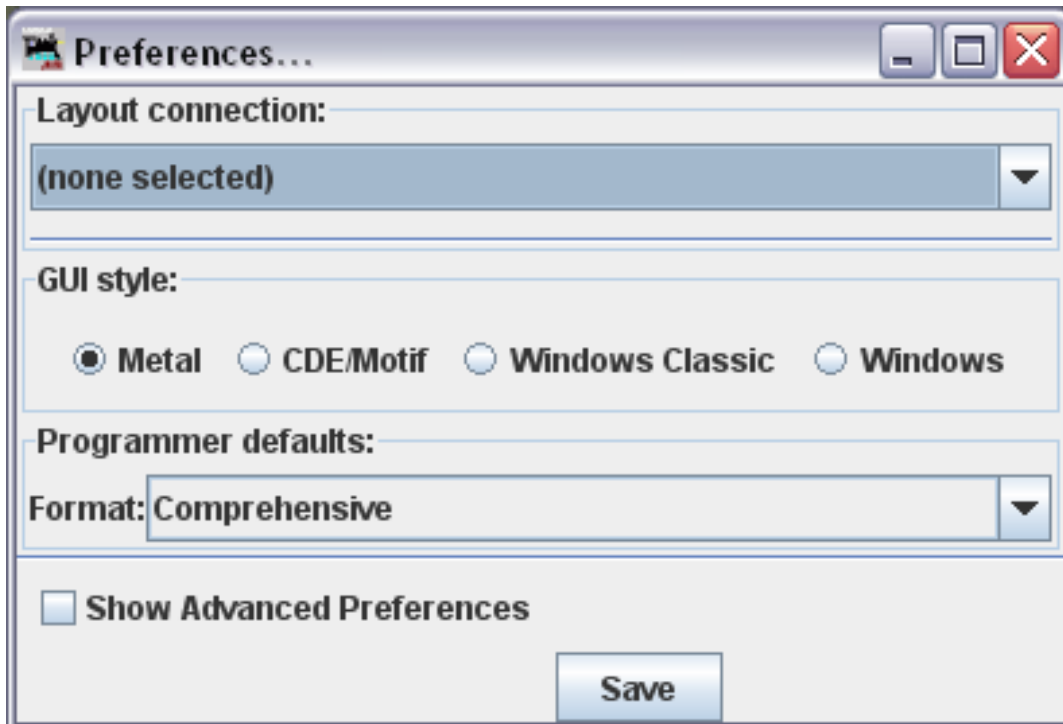


Click the “+” to open the Ports (COM & LPT) category and note the COM port assignment for the SPROG II (COM4 in this example).

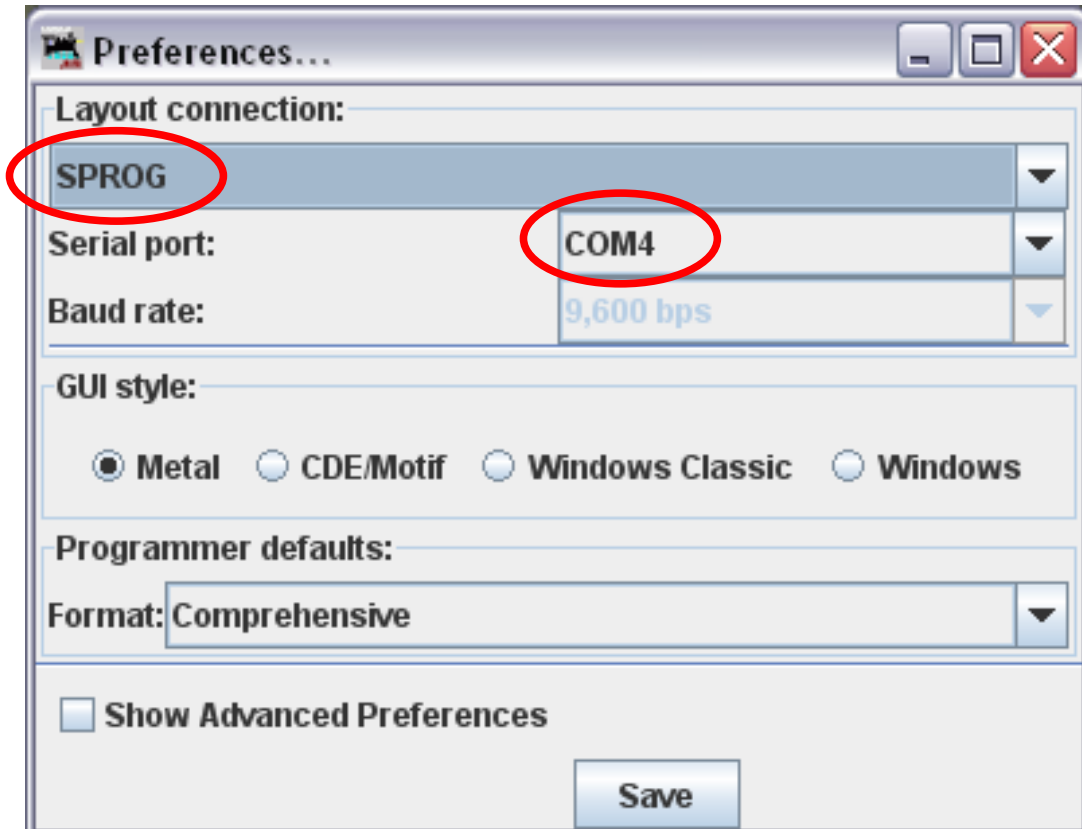
Now start DecoderPro by double clicking the icon that was placed on the Windows desktop during the installation.



Open the Edit -> Preferences dialog from the menu



Click the arrow in the Layout connections field and scroll down to select SPROG

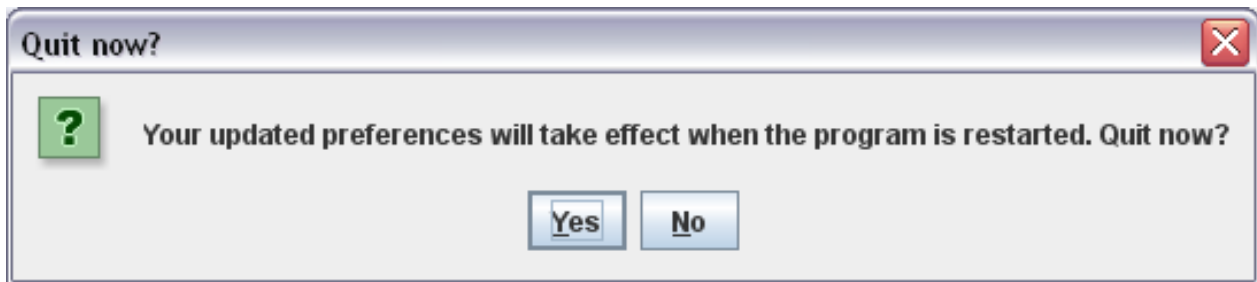


Click the arrow in the Serial Port field and select the COM port noted in the earlier step.

Select the desired GUI style. This is just the visual style of the windows. Choose the view that you like if you wish; it does not affect the program behaviour.

Select the Comprehensive Programmer Format

Click "Save"



Click "Yes". DecoderPro will save the new settings and exit.

Connect the Programming Track

- ! The programming track MUST be isolated from all other DC or DCC control systems and connected only to the SPROG II. Damage may result to the SPROG II or other equipment if this rule is not followed.**

Connect the SPROG II to the programming track using the "Track" terminals of the pluggable terminal block. There is no requirement to observe any particular polarity when connecting the programming track. The DCC output voltage will be approximately 1V below the power supply voltage.

During programming the track current is sensed 100 milliseconds after the programming track is powered up. If the current exceeds 250 milliAmps then the programming track power is removed to avoid potential damage to an incorrectly installed decoder.

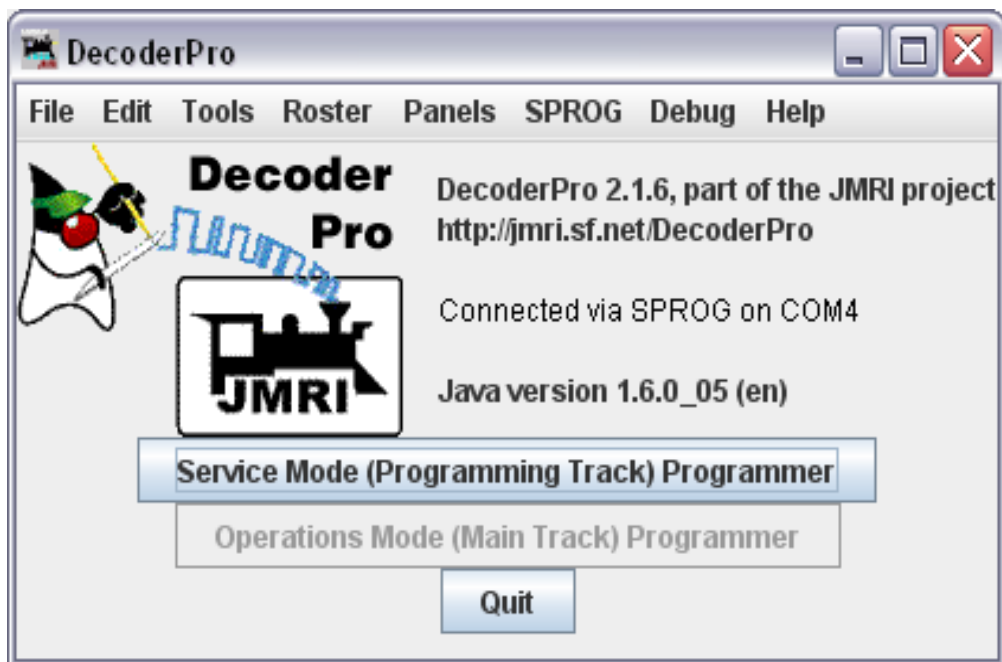
Getting Started With DecoderPro

See the DecoderPro website <http://jmri.sourceforge.net> for updates and latest information.

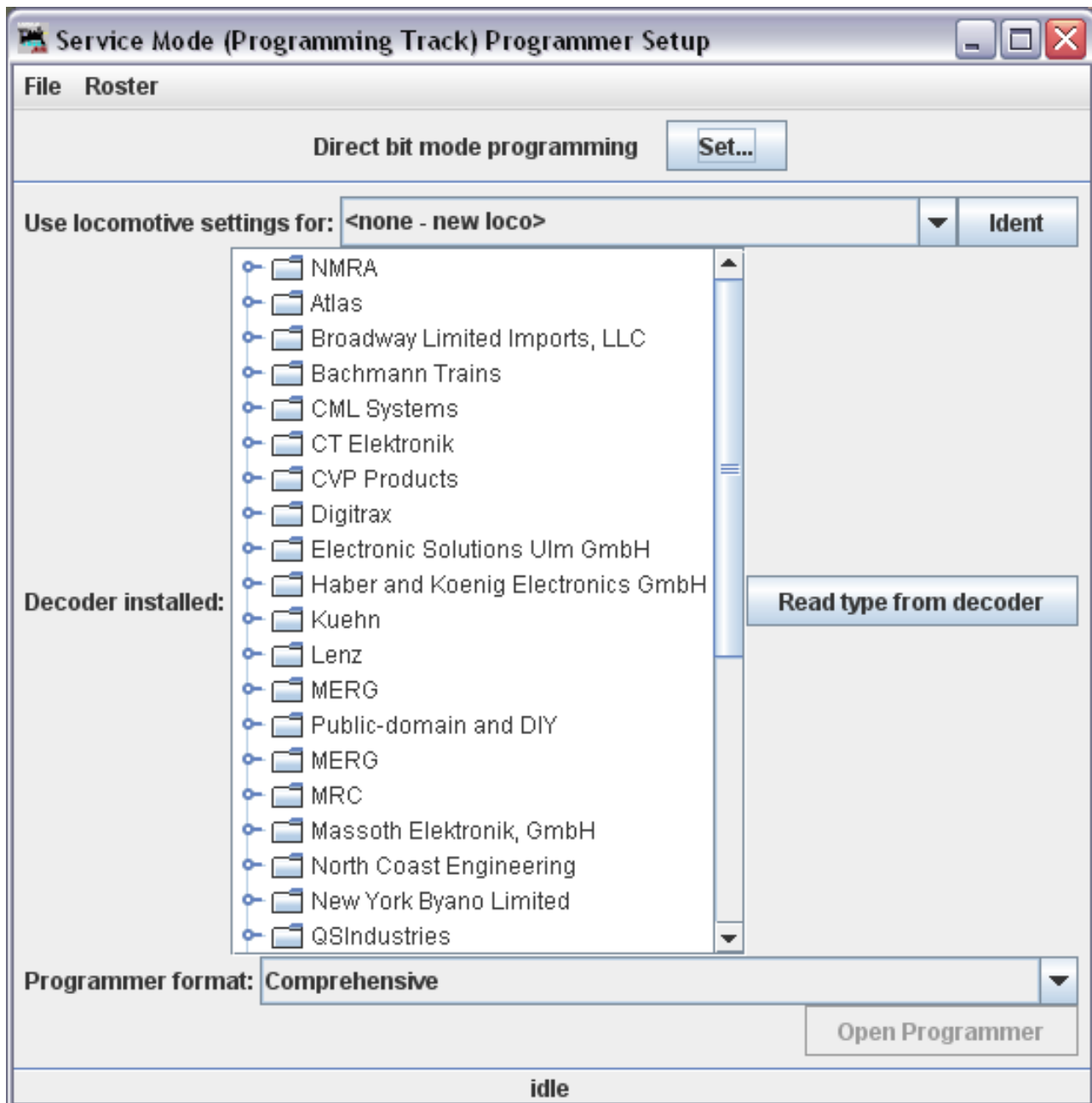
Join the JMRI Yahoo group <http://groups.yahoo.com/group/jmriusers> for help from other DecoderPro users and the team who develop it.

Ensure that all software and drivers are installed and that DecoderPro preferences have been setup.

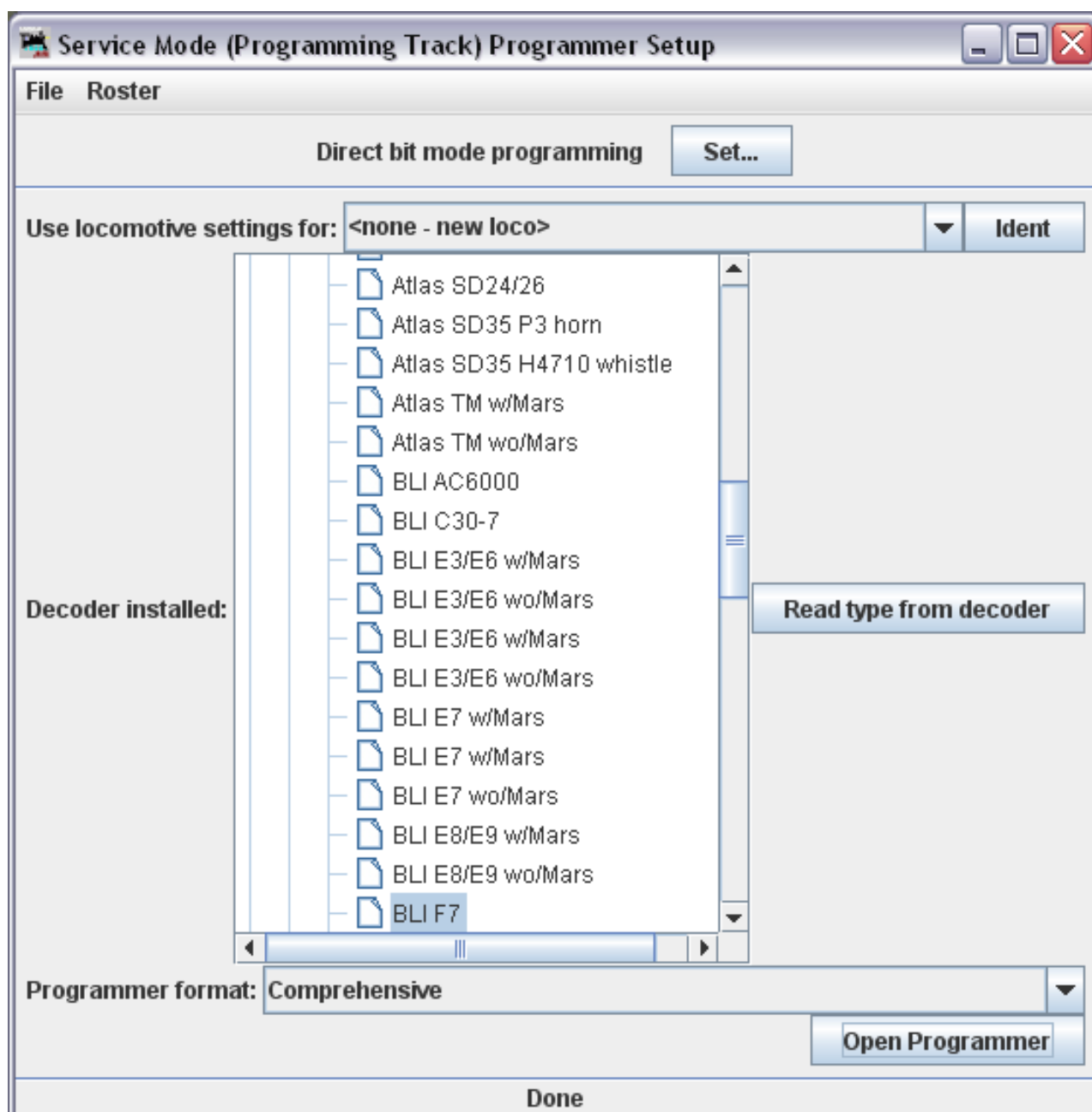
Start DecoderPro. The main window will open and show the current connection method. This merely reflects the preferences setting and does not actually indicate a physical connection. In the following example “Connected via SPROG on COM4”:



Click “Service Mode (Programming Track) Programmer” to open the Programmer Setup window. A new window will pop up which shows a list of decoder manufacturers.



Clicking the control or double clicking the folder icon next to a manufacturer name will open a list of decoder types from that manufacturer. You can always manually select a decoder type in this way. In most cases, DecoderPro can determine the manufacturer and decoder type automatically. Place a decoder equipped loco on the programming track and click on “Read type from decoder”. In the example below, DecoderPro has identified a QSI Industries BLI F7. Sometimes DecoderPro can identify the manufacturer but not exact model of decoder fitted. In these cases it will be necessary to select the decoder type manually.



Once the decoder type has been selected, click “Open Programmer”.

The service mode programmer window opens with a selection of “tabs”, grouped in rows below the menu bar. Clicking on a tab selects a group of CVs to be programmed, related to the title of the tab. The selection of tabs available will vary depending upon the features supported by your decoder and the CVs available.

On the “Roster Entry” tab you may enter arbitrary details of the loco to be saved on the PC for future reference. The DCC address field will be filled in by DecoderPro once the decoder has been read or programmed. If you wish to use the Roster then you should make sure to click “Save” on the Roster

Entry tab when you have finished programming the decoder. The Roster is especially useful if the decoder loses it's settings as seems to happen occasionally with some decoders. Alternatively, you may wish to program a second loco with similar CV settings.

Note on 'ID:' When you click Save, the ID will become the file name of the roster entry created for this loco, and also the entry in the list for you to be able to select a previously-programmed and saved loco in future. Name these entries wisely!. Many people use the loco type and number, or Operator/road name and number, but choose a system that will be meaningful to you.

Click on the “Basic” tab and you will see the most basic settings for the decoder including the address. Initially, all of the data fields are coloured red or yellow to show that no data has been read from or written to the decoder. There are eight read and write buttons at the bottom of the window. Click “Read full sheet” to read the data for the current tab from the decoder.

- ! Clicking “Read all sheets” will read every CV from the decoder and may
- take a considerable time to complete.

Program <new loco> in Service Mode (Programming Track)

File Reset

Function Output | Light Control | Multi Auto Lights | BEMF | Indexed CVs | QSI Misc.

Consist | Advanced | Sound | Sound Levels | CVs | Sound / Volume Control

Roster Entry | **Basic** | Motor | Speed Control | Function Map | Lights | Analog Controls

Active DCC Address: 3 ☒ One byte (short) address ☐ Two byte (extended) address

Primary Address 3

Extended Address 0

Address Format One byte (short) address ▼

Locomotive Direction normal ▼

FL Location 28/128 speed step format ▼

Power Source Conversion NMRA Digital only ▼

Manufacturer ID 113

Manufacturer Version No 0

Product number 0

Read changes on sheet | Write changes on sheet | Read full sheet | Write full sheet

Read changes on all sheets | Write changes on all sheets | Read all sheets | Write all sheets

Direct bit mode programming Set...

idle

Each data field should return to white or the background colour of the window.

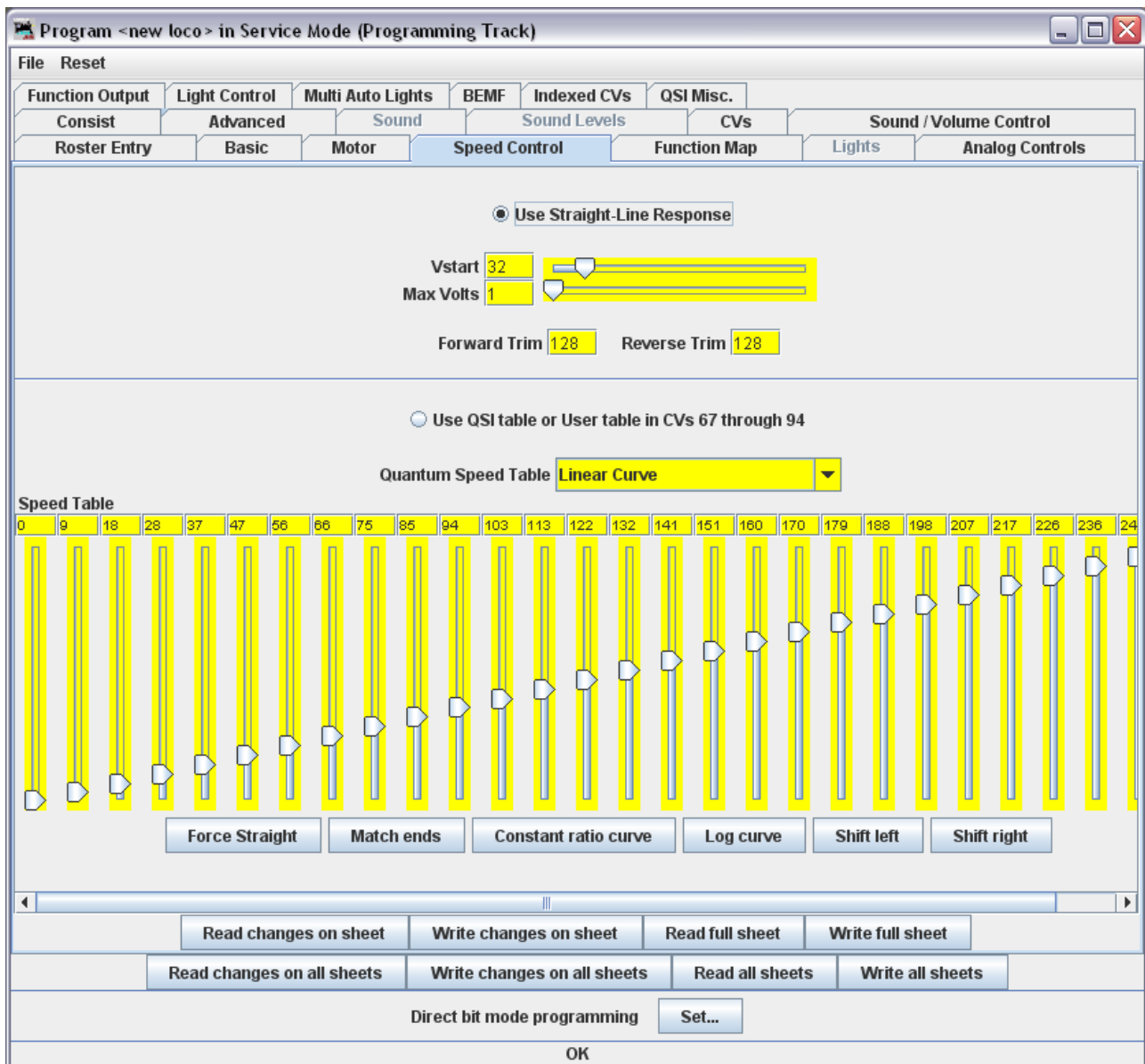
To change to locos address, type a new address in the Active DCC Address followed by carriage return. The address field will turn orange, indicating that the address has been changed but not yet written to the decoder. Select the type of address to be set (short or extended).

The screenshot shows the 'Program <new loco> in Service Mode (Programming Track)' window. The 'Basic' tab is selected, showing various configuration options for a locomotive. The 'Active DCC Address' field is highlighted in orange and contains the value '55'. Below it, the 'Primary Address' is '3' and the 'Extended Address' is '55'. The 'Address Format' is set to 'Two byte (extended) address'. Other settings include 'Locomotive Direction' (normal), 'FL Location' (28/128 speed step format), and 'Power Source Conversion' (DC conversion enabled). On the right, the 'Manufacturer ID' is '113', 'Manufacturer Version No' is '7', and 'Product number' is '104'. At the bottom, there are buttons for 'Read changes on sheet', 'Write changes on sheet', 'Read full sheet', 'Write full sheet', 'Read changes on all sheets', 'Write changes on all sheets', 'Read all sheets', 'Write all sheets', and a 'Direct bit mode programming' section with a 'Set...' button. An 'OK' button is at the very bottom.

Click “Write changes on sheet” to write the new address to the decoder. The address will turn red and then white as it is written to the decoder. You can set other basic properties such as the direction and DC operation on this tab.

The other tabs work in a very similar way. You may find it useful to have the decoder documentation available when setting more complex or manufacturer specific features.

Next we’ll look at the Speed Control tab that allows you to fine tune the way the loco responds to the throttle. Click on the “Speed Control” tab.



The decoder in this example has a choice between “Use Straight-Line response” and “Use QSI table or User table in CVs 67 through 94”. The “look and feel” of this tab will vary between decoders but most recent decoders support the use of a speed table.

It is left as an exercise for the reader to experiment with the sliders for setting the speed table and the buttons just below. The “Force Straight” option will give a linear relationship between the throttle position and the speed of the loco. “Constant ratio curve” will give little change in speed at low throttle settings, greater change at higher throttle.

Remember to write the changes on each sheet before moving to a new one.

Next, click on the “Function Map” tab.

The Function Map allows you (in those decoders that support it) to control which throttle function key is mapped to each output wire or operation (e.g. sound effect) of the decoder.

Program <new loco> in Service Mode (Programming Track)

File Reset

Function Output	Light Control	Multi Auto Lights	BEMF	Indexed CVs	QSI Misc.
Consist	Advanced	Sound	Sound Levels	CVs	Sound / Volume Control
Roster Entry	Basic	Motor	Speed Control	Function Map	Lights Analog Controls

Use this sheet to determine which functions will control which outputs

Description	Output wire or operation													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Forward Headlight F0(F)	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reverse Headlight F0(R)	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Function 1	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Function 2	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Function 3	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Function 4	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Function 5	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐
Function 6	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
Function 7	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
Function 8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
Function 9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
Function 10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐
Function 11	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐
Function 12	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒

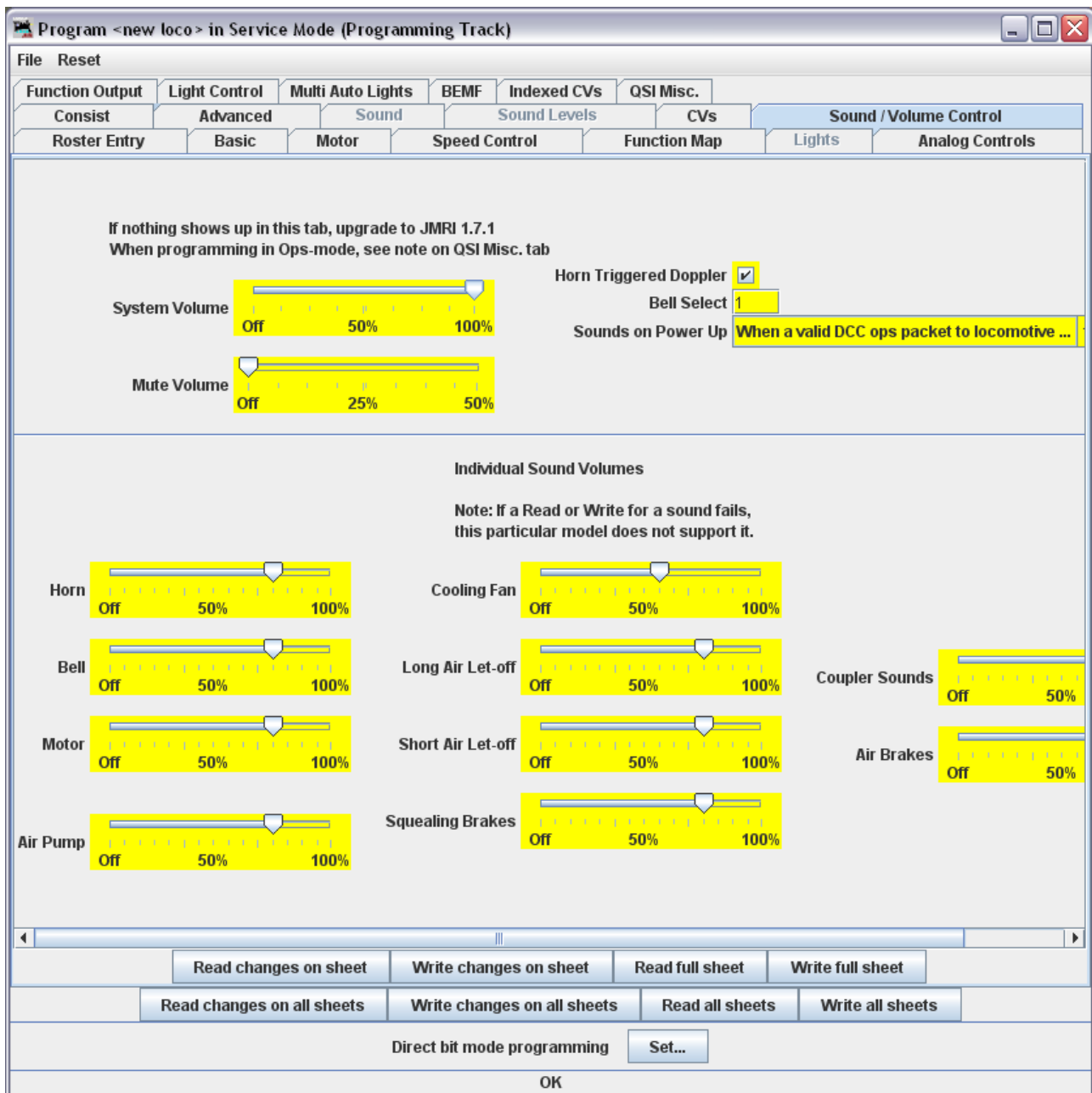
Read changes on sheet Write changes on sheet Read full sheet Write full sheet

Read changes on all sheets Write changes on all sheets Read all sheets Write all sheets

Direct bit mode programming Set...

OK

DecoderPro comes into its own for programming the many and varied options in a sound decoder. Here is an example Sound tab from the BLI F7 where the volume of individual effects may be set.



Again, remember to write your changes.

Hovering over an item with the cursor will often show a short description for that item, but It is highly recommended that you read the documentation for your decoder to get the best from it with DecoderPro.

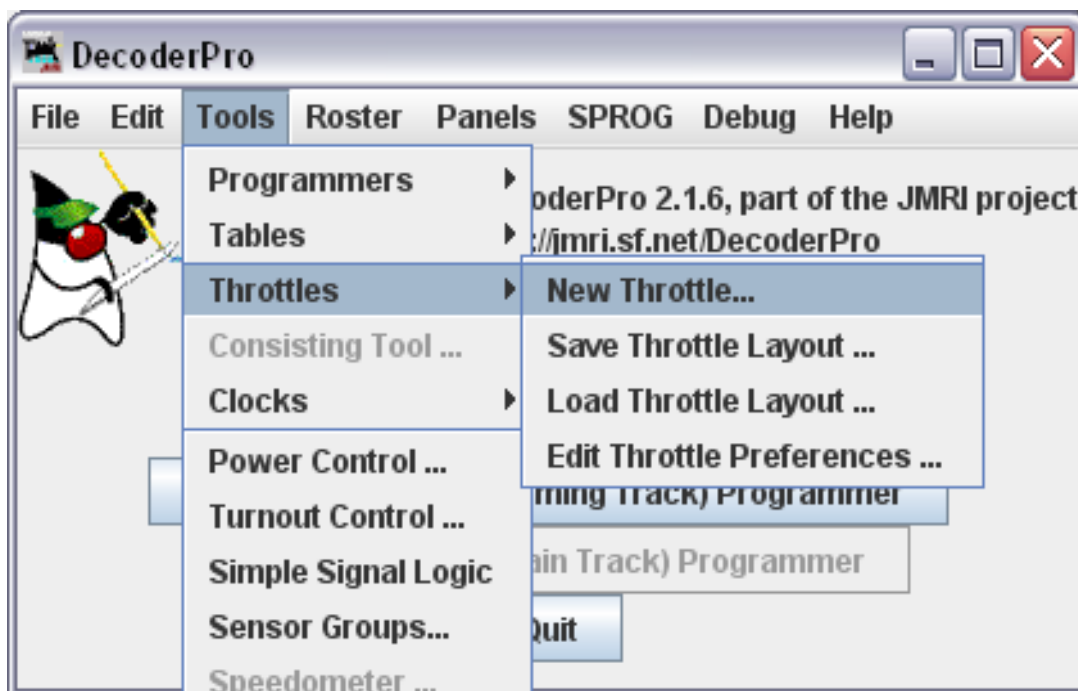
Using the DecoderPro Throttle

Using a DecoderPro throttle, it is possible to test run a loco after programming CVs, e.g., to test the effect of changing the speed table of function mapping. Using a rolling road or a continuous loop of track for programming is recommended for test running.

Using PanelPro and the throttle, it is possible to control a small “one engine in steam” layout, including control of accessories (e.g. point motors) with SPROG II. More than one loco may be present on the layout but only one may be selected on the throttle and driven at one time.

! Care should be taken when using the service mode programmer that only one loco is on the layout during programming, or that the layout is isolated except for a short section of track for programming. If a programming operation is performed whilst the whole layout is connected, then incorrect data will be read from CVs and all locos on the layout will be re-programmed.

On the main DecoderPro window, click on the “Tools” menu item and then select “Throttles” and “New Throttle...”

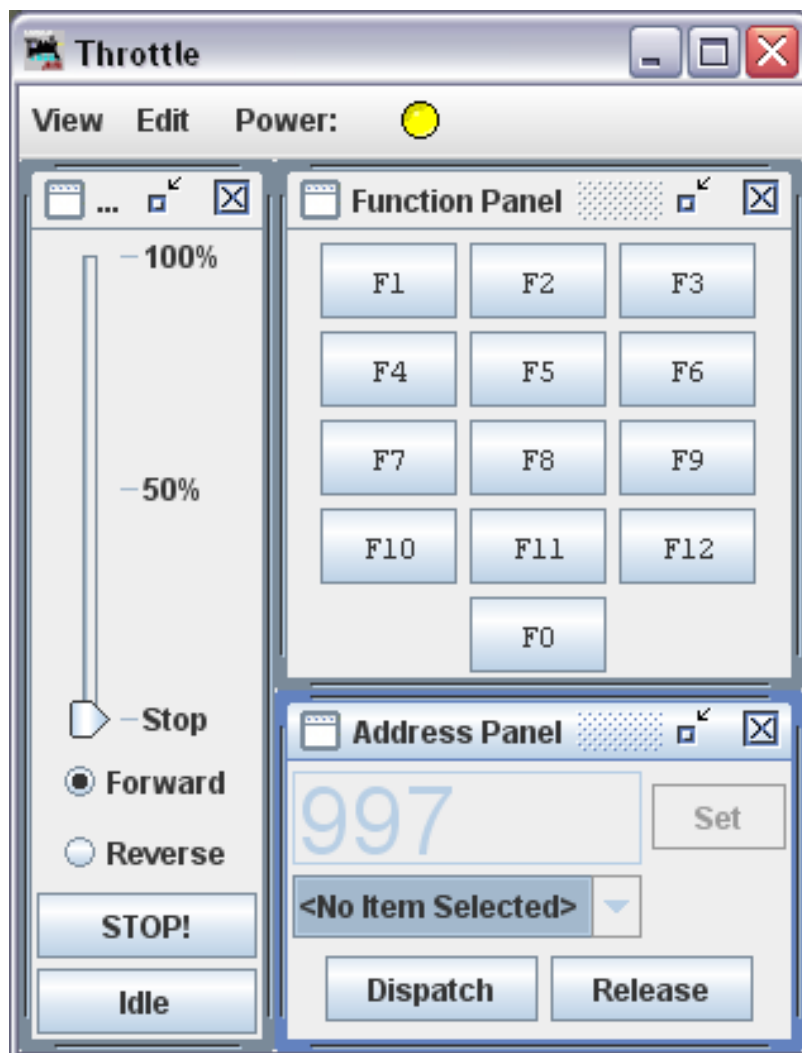


SPROG II, when used as a programmer, supports the use of one DecoderPro throttle. See “Layout Control with SPROG II” for details of how to use SPROG II as a command station with multiple throttles.

When the throttle window opens, enter the loco address and click “Set”.

With SPROG II, loco addresses less than 128 are assumed to be short (2 digit) addresses. Addresses greater than 127 are assumed to be extended (4 digit) addresses.

Setting the loco address will enable the function buttons and speed slider.



The LED icon in the centre of the menu bar is the track power control and must be clicked until it is green to turn on the track power. The SPROG II power LED will flash when the track power is live.

Note: After programming using the service mode programmer, the track power is always left in the off state and must be turned on again from the throttle power control before the loco can be run.

The function keys have a latching operation. Click once to turn a function on, click again to turn the function off.

To control the loco speed, click and drag the slider caret (the pointy bit!). For fine control of speed, click on the slider just above or below the caret.

The “STOP!” button will stop the loco but does not turn off the track power.

To set a different loco address, click the “Dispatch” or “Release” button. These two buttons have the same effect with SPROG II.

Speed Matching of Locos

To come in a future release of this document...

Measuring Loco Current

Loco current may be measured by using SPROG II in command station mode and using the slot monitor, see “Layout Control with SPROG II”.

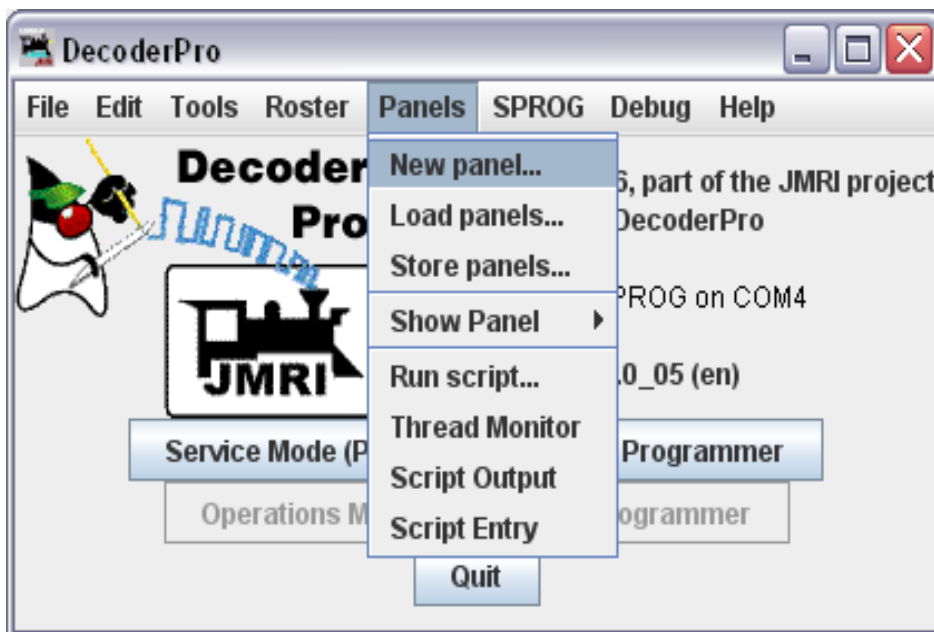
Getting Started With PanelPro

The PanelPro tool included with JMRI allows SPROG II to be used for the control of DCC accessory decoders for point (turnout) control.

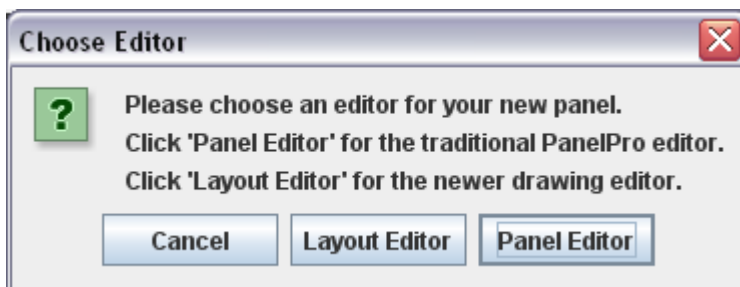
The limited output voltage and current capability of SPROG II means that it is not suitable for use with accessory decoders that take power from DCC. Accessory decoders should be chosen that take commands from DCC but use a separate power input for the point motors.

This is only a very brief introduction, see the PanelPro homepage at <http://jmri.sourceforge.net/apps/PanelPro/PanelPro.html> for more details.

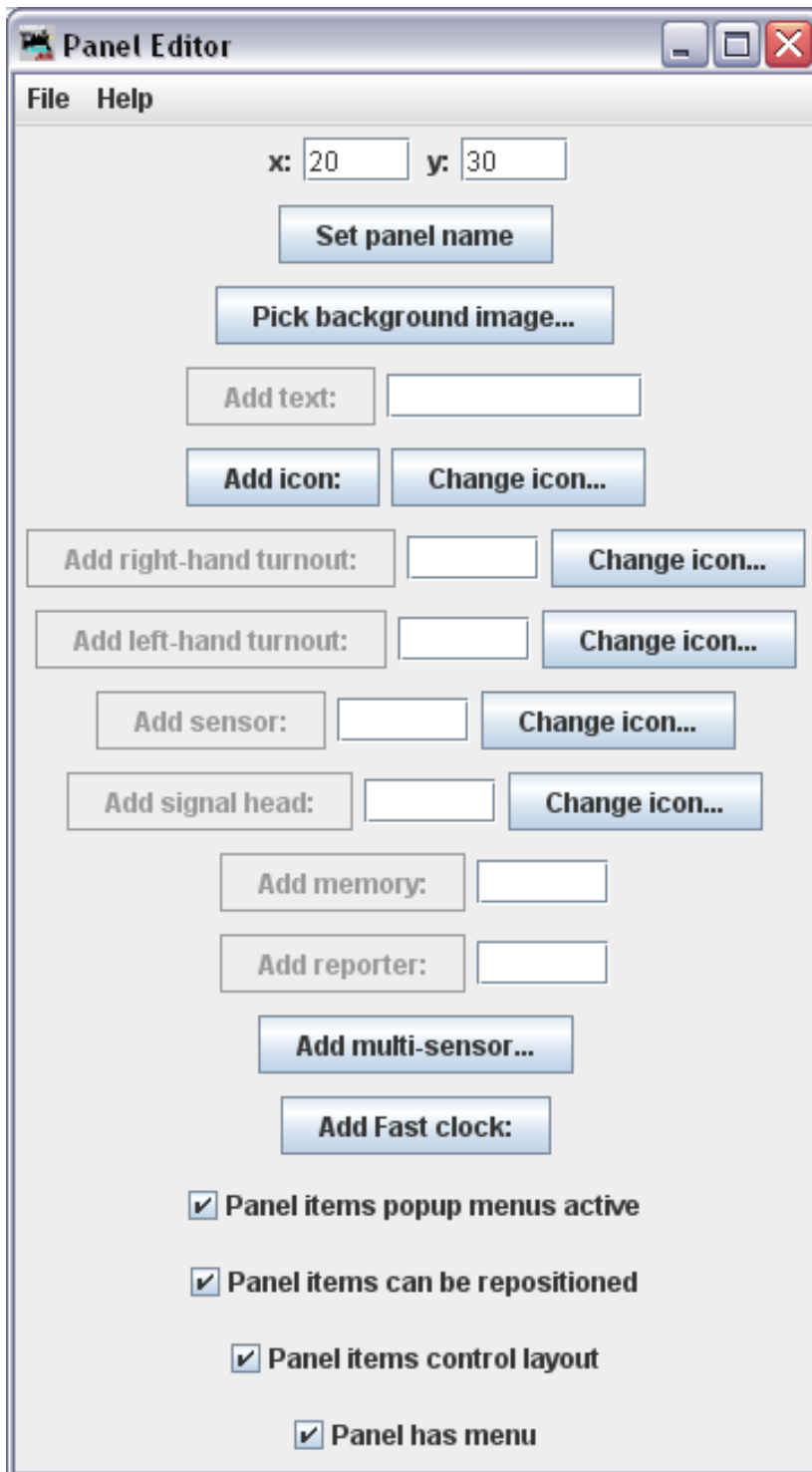
On the main DecoderPro window, click on the “Panels” menu item and then select “New Panel...”



Choose the Panel Editor



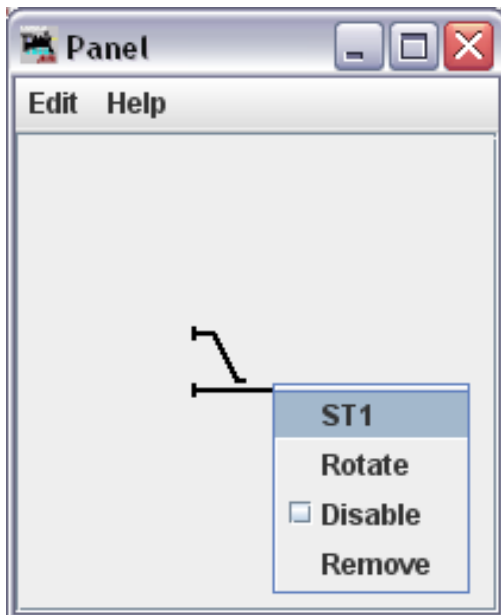
A blank Panel and the Panel Editor window will open



You can set the panel name to be used when saving the panel. Use the File menu in the panel editor to save the panel.

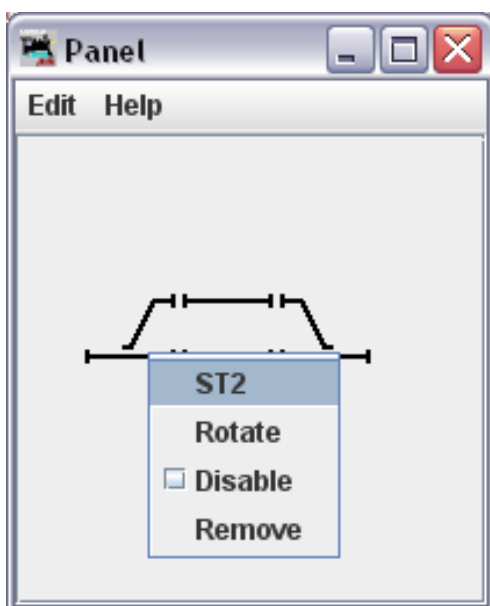
You can draw a background track plan in a graphical editing tool and then load the image as the background for the panel. It may take some experimenting to get the track spacing correct to match the panel icons.

To add a turnout, click in the box next to the “Add right/left-hand turnout” button. Enter the accessory address of the turnout and click the appropriate “Add” button. A turnout icon will be added to the panel. The icon may be repositioned by clicking and holding the right mouse button and dragging the icon to its new position. In the example below, a right-hand turnout has been added and moved. The pop-up menu shows the accessory address prefixed with “ST” for “SPROG Turnout”. The turnout may be rotated, disabled or removed using the same menu.



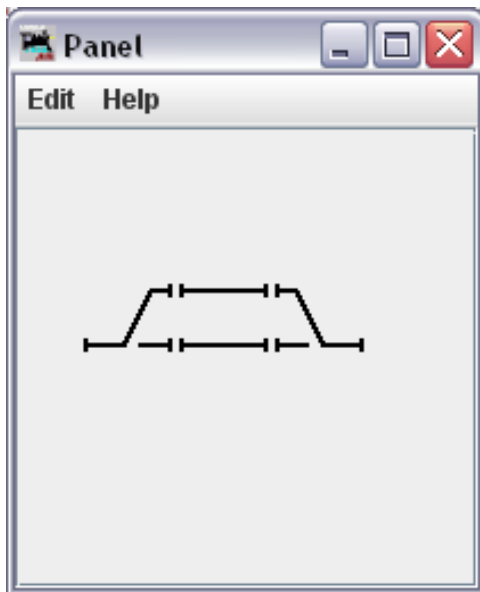
Clicking the “Add icon” button will add a straight track section

In the next step two straight line segments and a left hand turnout (address 2) have been added and aligned to represent the layout of a passing loop.



Left clicking on a turnout icon will change the icon and send the appropriate DCC accessory command to change the turnout on the layout. Here, both turnouts have been clicked to select the route into and out of the passing loop.

! The track power must be on for any accessory commands generated from the panel to be effective.



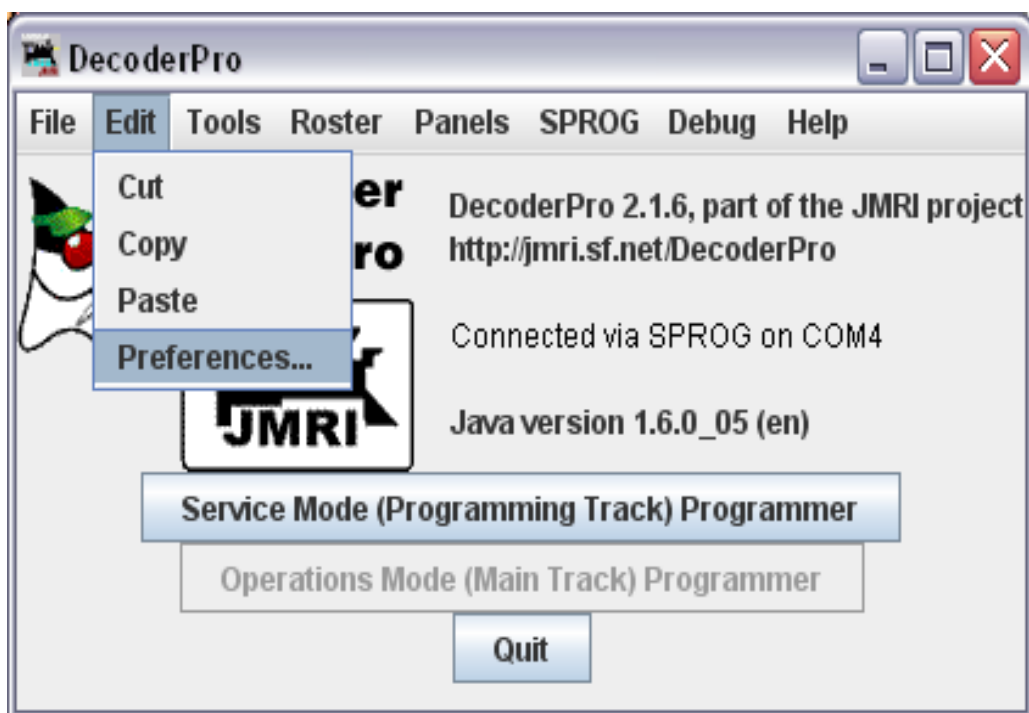
Layout Control with SPROG II

SPROG Command Station Mode

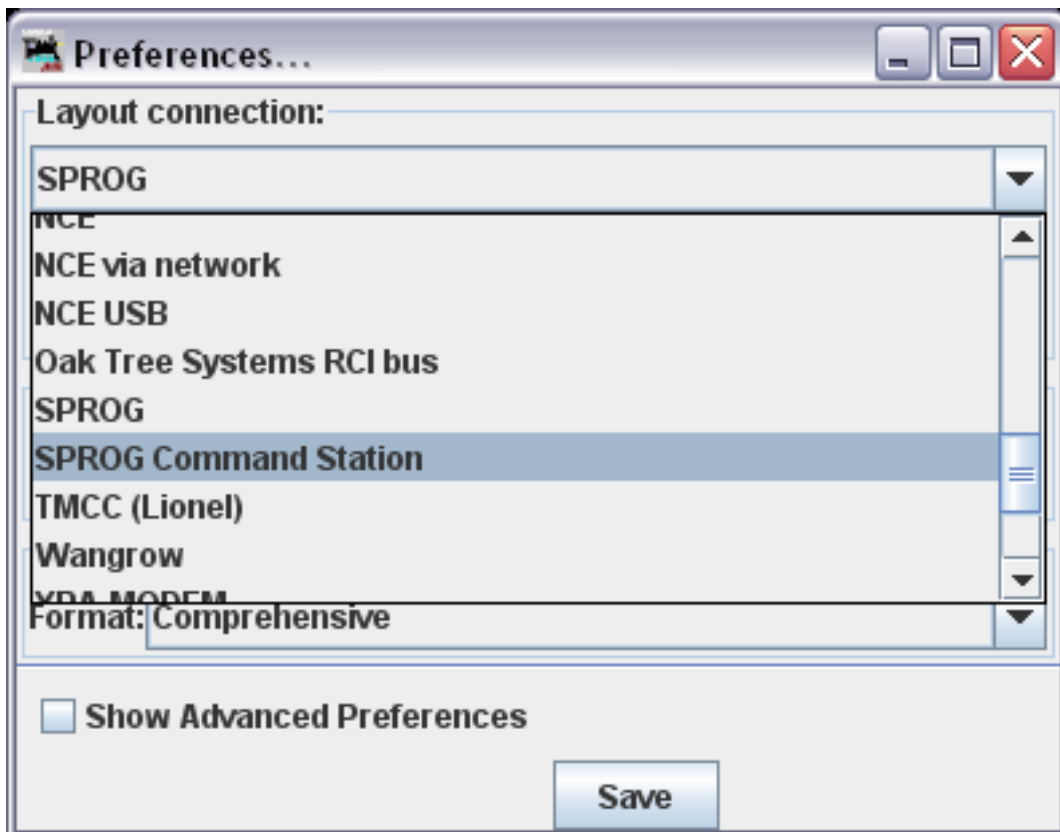
A new feature in DecoderPro versions from 1.9.2 onward is the ability to use SPROG II as a command station with control of multiple locos through on screen throttles.

When operating in this mode, SPROG II is no longer a service mode (programming track) programmer. CVs may still be written in operations mode (also known as “on the main” programming) but the contents of CVs cannot be read back.

To use SPROG II as a command station, you must first modify the DecoderPro preferences in a similar manner as was done during initial installation of the SPROG II.

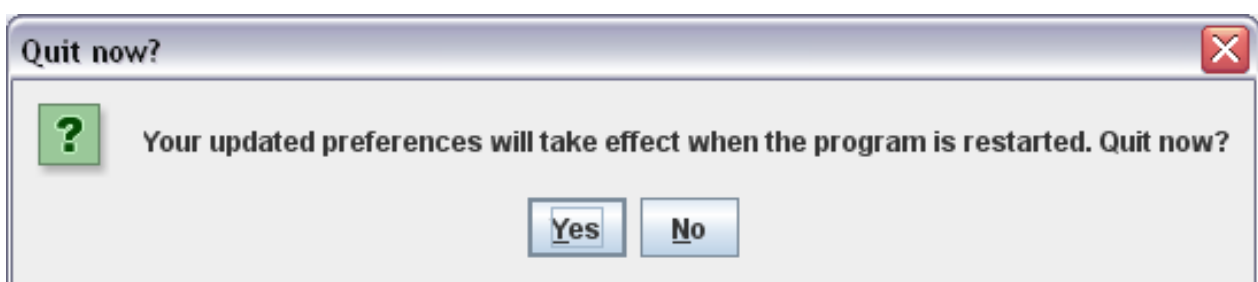


Open the Edit -> Preferences dialog from the menu



Click the arrow in the Layout connections field and scroll down to select “SPROG Command Station”.

Click “Save”

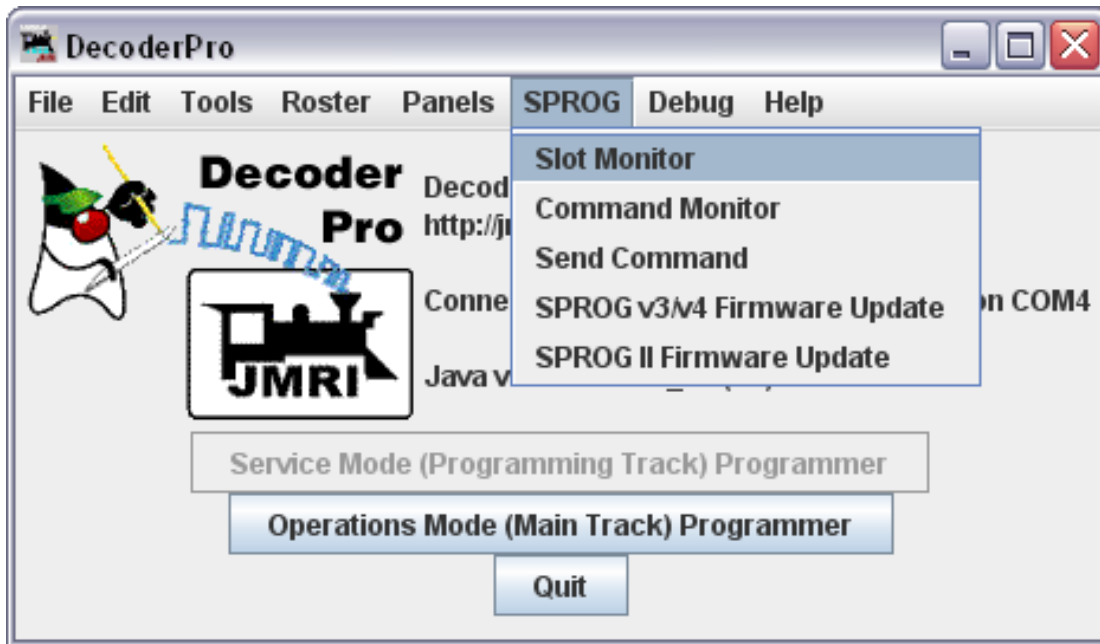


Click “Yes”. DecoderPro will save the new settings and exit.

Start DecoderPro again. You may now open multiple throttles, one for each loco you wish to control. See below for a note on the limit to the number of locos that can be controlled.

Use the power control in any of the throttles to turn the track power on or off.

An additional feature in Command Station mode is the slot monitor which is accessed from the SPROG menu in the main DecoderPro window



The top portion of the slot monitor contains a checkbox to control whether unused slots are displayed, a button to force an emergency stop of all locos and the output current being supplied by the SPROG II.

! The output current reading will not reflect the layout current if an external booster is being used.

The output current readings are filtered and averaged over a number of readings by SPROG II and the display in the slot monitor will change more slowly than the actual output current.

The remainder of the slot monitor is the list of slots, at least one slot is associated with each throttle (see below).

Slot		Address	Speed	Use		Consi...	Dir
0	E Stop	997	35	In Use	Free	<n/a>	R
1	E Stop	1	43	In Use	Free	<n/a>	F
2	E Stop	0	0	Free	Free	<n/a>	F
3	E Stop	0	0	Free	Free	<n/a>	F
4	E Stop	0	0	Free	Free	<n/a>	F
5	E Stop	0	0	Free	Free	<n/a>	F
6	E Stop	0	0	Free	Free	<n/a>	F
7	E Stop	0	0	Free	Free	<n/a>	F
8	E Stop	0	0	Free	Free	<n/a>	F
9	E Stop	0	0	Free	Free	<n/a>	F
10	E Stop	0	0	Free	Free	<n/a>	F
11	E Stop	0	0	Free	Free	<n/a>	F
12	E Stop	0	0	Free	Free	<n/a>	F
13	E Stop	0	0	Free	Free	<n/a>	F
14	E Stop	0	0	Free	Free	<n/a>	F
15	E Stop	0	0	Free	Free	<n/a>	F

In this example, SPROG II is supplying 163mA to the layout. A loco with address 997 is running in reverse at speed step 35 and a loco with address 1 is running forwards at speed step 43

When you use a function button on a throttle, you will see an extra slot occupied momentarily with the address of the loco on that throttle and speed 0. This indicates that the function command is being sent to the loco. To allow for errors in reception, function commands are repeated three times. After the third copy is sent, the slot will be cleared.

Short (one byte) Versus Extended (two byte) Addressing

The DCC specification allows two forms of loco address:

- Short addresses in the range 1 – 127
- Extended addresses in the range 1 – 10239

Most DCC system impose their own arbitrary limits on these address ranges. In SPROG Command Station mode the allowable address ranges are:

- Short addresses *TBD...*
- Long addresses *TBD...*

How Many Locos Can Be Controlled?

Sixteen slots are available, but SPROG II is not capable of operating sixteen locos without an external booster.

Run each loco individually with a representative load and note the current reading. The total required for your layout will depend upon the “diversity” or how many, and which, locos are to be operated at the same time.

It should be possible to run at least 3 or 4 modern HO, 00 or N lightly loaded locos.

Some slots should always be left free for sending function control commands. These free will be shared between throttles as required, it is not necessary to have a free slot for every throttle.

Using an External Booster with SPROG II

Yes, it is possible.

To come in a future release of this document...

Connecting and Using Multiple SPROG IIs

At the present time it is not possible to use the alternate connection method in DecoderPro to connect a second SPROG II.

It is, however, possible to run two (or more) separate instances of DecoderPro connected to two (or more) SPROG IIs, e.g.

- One SPROG II in command station mode running the layout

- One SPROG II in normal or command station mode running PanelPro to control accessories

- One SPROG II in normal mode connected to a programming track

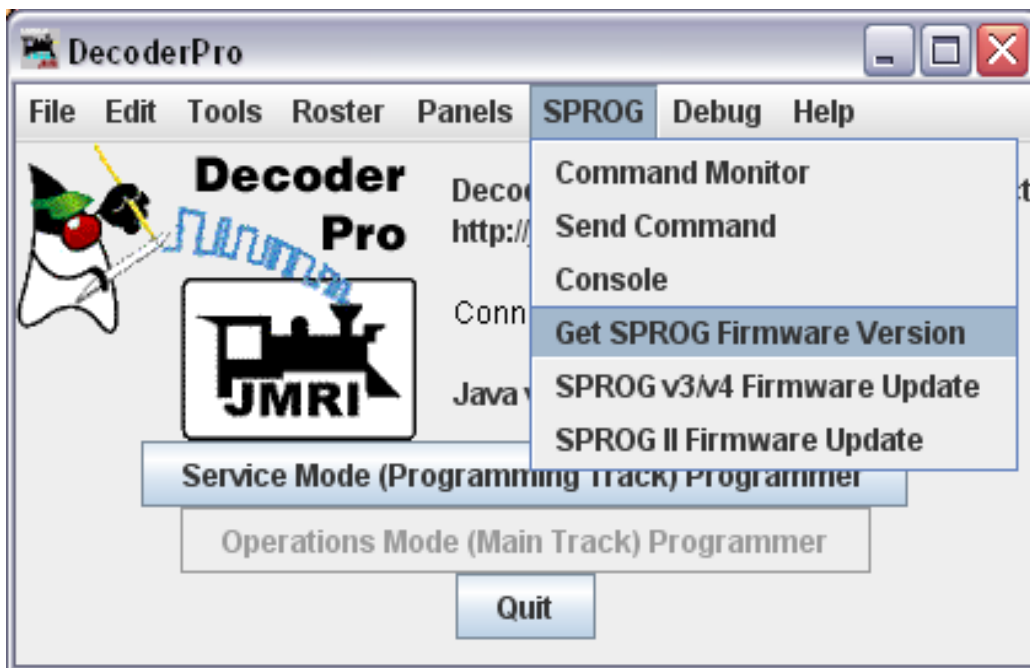
If used this way, the programming track should be wired via a DPDT switch so that it can be connected to the main layout (to allow locos to be driven on to it) or connected to the SPROG II programmer, not both at the same time.

! Never connect more than one SPROG II or a SPROG II and any other DCC booster or DC controller to the same section of track.

Determining the SPROG II Firmware Version

! This feature is only available in DecoderPro version 2.1.5 and later.

Select “Get SPROG Firmware Version” from the SPROG menu



The SPROG firmware version will be displayed in a new window.

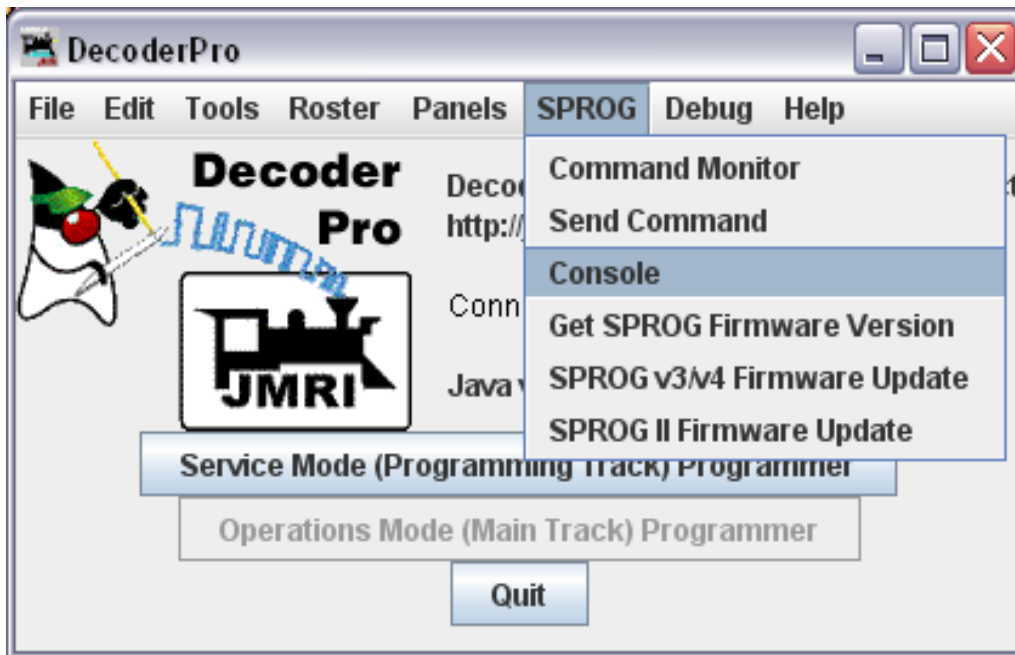


Click “OK” to close the window.

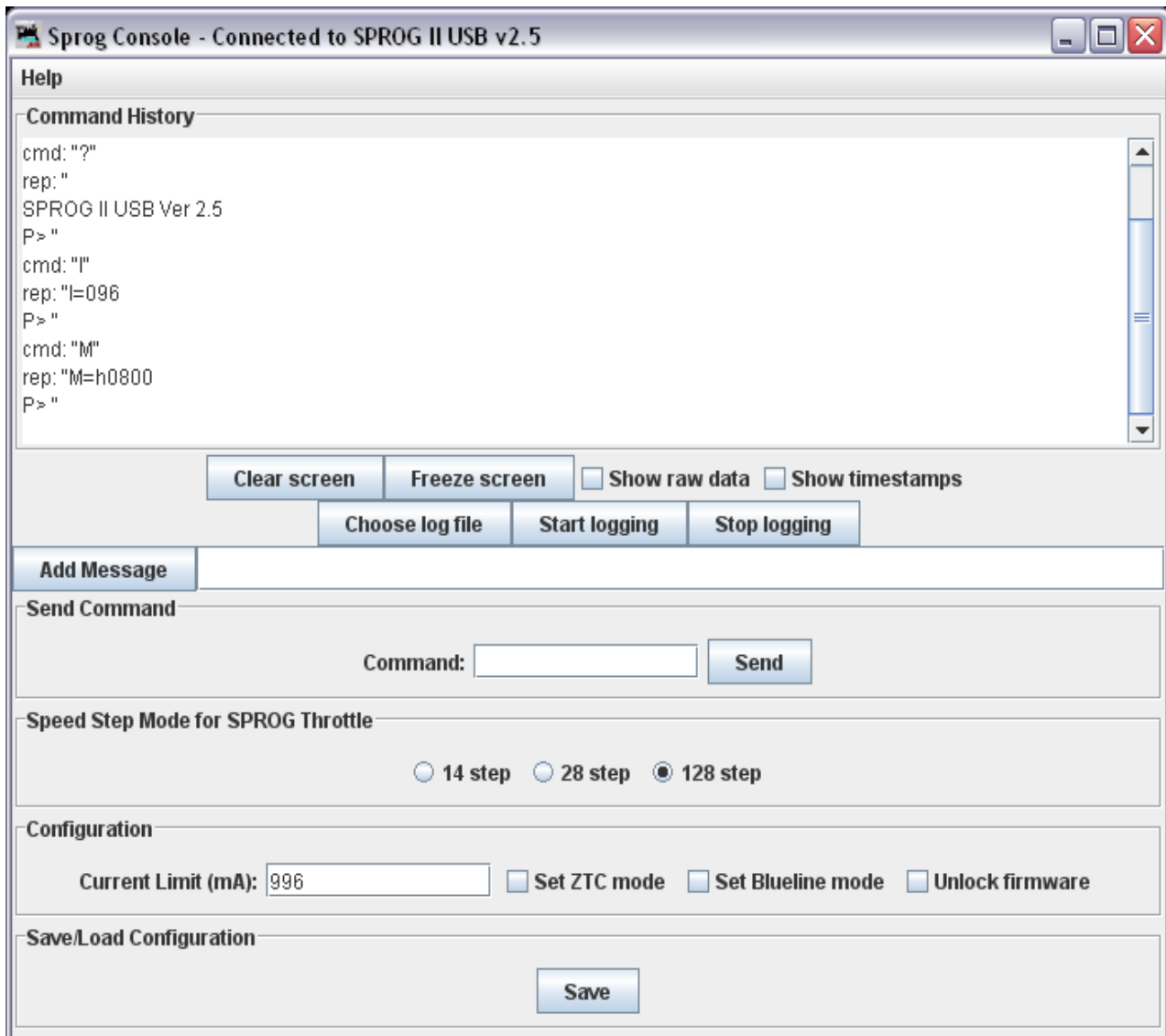
The SPROG Console

! This feature is only available in DecoderPro version 2.1.5 and later.

The SPROG console allows optional SPROG features to be enabled and disabled. Select the SPROG Console from the SPROG menu



A typical console display is shown below. Some features may not be available, depending upon the firmware version of the SPROG.



Title Bar

The title bar includes the type and firmware version of the connected SPROG, e.g SPROG II USB v2.5.

Command History

The command history pane provides the same functionality as the basic Command Monitor (available on the SPROG menu) and captures commands to and replies from the SPROG. The history may be saved to a file on the computer by first choosing a log file and then selecting "Start logging". The command history can be useful in diagnosing problems encountered in using the SPROG.

The “Add Message” field can be used to add annotations to the command history.

Send Command

The “Send Command” field provides the same functionality as the basic Send command utility available on the SPROG menu. Enter a command in the Command field and press return on the keyboard or click the send button to send the command to the SPROG.

Selecting SPROG Operating Modes

- ! After changing any of the following modes, you should use the “Save” button to store the changes in the SPROG.

Speed Step Modes

Choose the speed step mode to be used by the SPROG throttle. The default is 128 step, which is recommended for all recent DCC decoders.

Current Limit

Set the current limit for the SPROG track output when using a SPROG throttle, or when connected in Command Station mode. The maximum current limit is 996mA or 0.996 Amps.

Set ZTC Mode

Some older ZTC decoders cannot be reliably programmed on some systems, even though they conform to the DCC standards. Select this option to configure SPROG for programming these decoders. It should still be possible to program other decoders with this mode enabled. If in doubt, disable this mode by de-selecting the tick box.

Set Blueline Mode

Blueline decoders use a slightly different interpretation of the DCC standards for direct mode programming to that normally assumed by SPROG. Select this option to configure SPROG for programming Blueline decoders in direct mode.

It will still be possible to program most other decoders with this mode enabled, but reading CVs from the decoder will be slower. If in doubt, disable this mode by de-selecting the tick box.

Unlock Firmware

Select this option if you are about to update the SPROG firmware using the bootloader. This mode is automatically canceled when the power is removed from the SPROG.

Save

Always click this button after selecting a new mode. The selected modes (apart from “Unlock Firmware”) will be stored in the SPROG, so that they are effective each time you use your it, even after the power has been removed.

Updates to the SPROG II Firmware

The “firmware” is the small computer program that runs on the microprocessor at the heart of the SPROG. Occasionally it becomes necessary to update the SPROG firmware to add new features or fix bugs.

The SPROG DCC philosophy is that all versions of SPROG, whether SPROG or SPROG II, USB or serial are totally forwards and backwards compatible and that any new features and bug fixes are made available to all existing users.

The firmware can be updated by returning your SPROG to SPROG-DCC (or appointed representative) or, for some SPROG versions, by using the “bootloader” (see below).

Returning Your SPROG for Update

If your version of SPROG does not support the bootloader then please contact us to discuss returning it for update. This is usually free of charge but return postage is always appreciated. To avoid a large workload, please only request an upgrade if you are sure you require it, e.g. for programming QSI sound decoders.

Firmware Update Using the Bootloader

! Currently, the bootloader is only supported on USB SPROG IIs with firmware version 2.4 and above.

The “bootloader” is a feature of SPROG that allows new firmware to be downloaded to the SPROG via the normal USB connection.

Before proceeding, please download and install DecoderPro version 2.1.7, or later and ensure that your SPROG is firmware version 2.4 or later (see “Determining the SPROG II Firmware Version”).

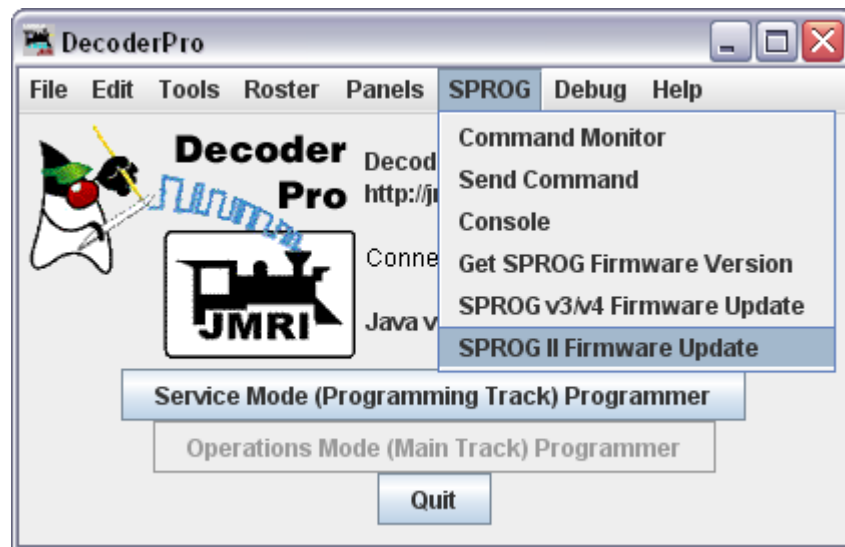
Download the new firmware (if available) as a .hex file from the SPROG-DCC website and save it in a convenient place on your computer.

! If the bootloader download is interrupted for some reason (e.g. if power or USB connection are removed), the SPROG may be left in an unusable state. In this case it will need to be returned for repair.

Follow the step-by-step instructions to download the new firmware:

1. Open the SPROG console in DecoderPro (see “The SPROG Console”).
2. Tick the “Unlock firmware” selection by clicking with the mouse.

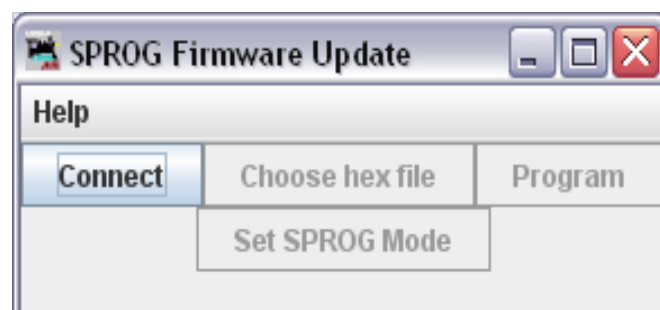
3. Click "Save" and close the Console.
4. Select the "SPROG II Firmware Update" utility from the SPROG menu.



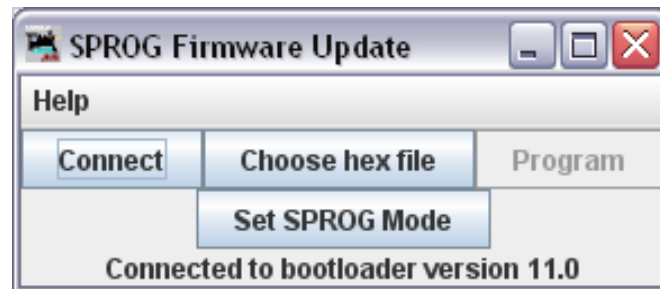
Click "Update" if you have the new firmware file available and are ready to proceed.



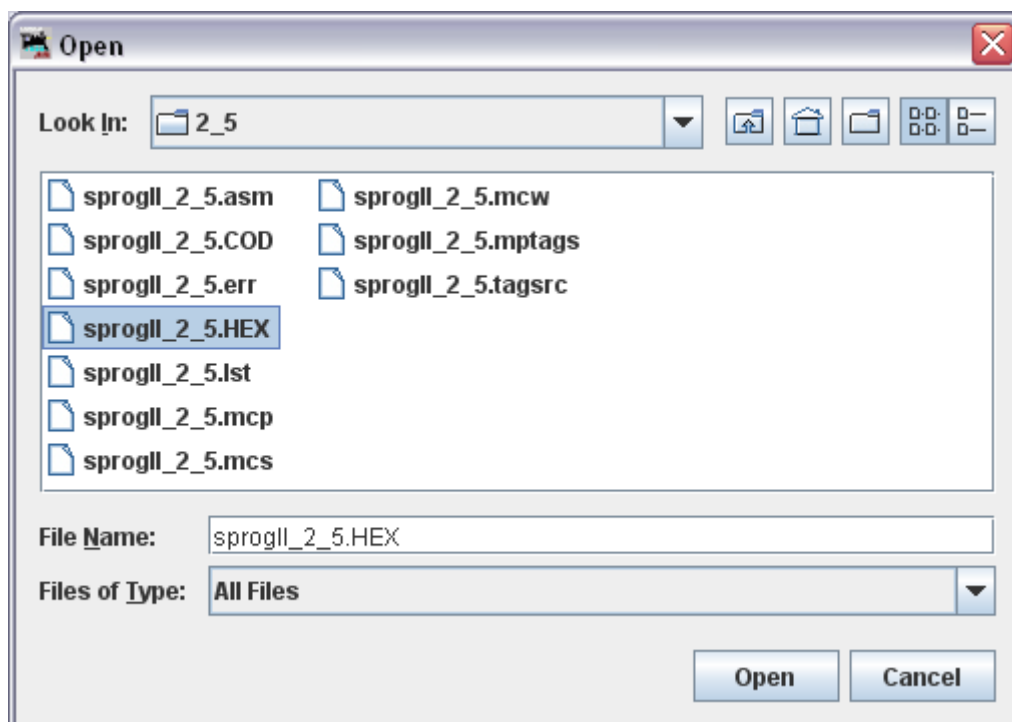
Click "Connect"



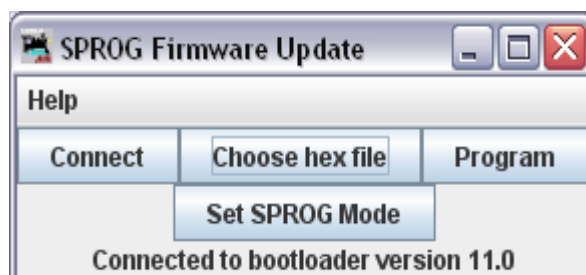
Click “Choose hex file” and navigate to the directory where you saved the downloaded .hex file.



Open the firmware file.

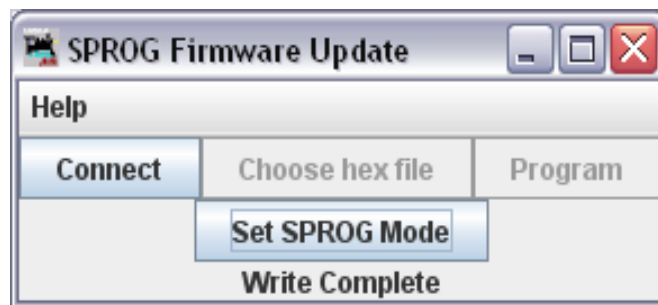


Click “Program”



First the old firmware will be erased, and then the new firmware will be written. Progress is reported in the status line of the window. If the Console is still open, you will also see the messages flowing between the computer and the SPROG.

When “Write Complete” is displayed, click “Set SPROG Mode”.



Close the window and the firmware update is complete.

SPROG Commands

This section gives information for advanced users who may wish to write their own software for controlling a SPROG.

Commands may be sent directly to SPROG II by using a terminal emulator program such as windows HyperTerminal, by using the SPROG console or even from programs that you write yourself.

The virtual COM port should be set for 8 bits, no parity, one stop bit at a speed of 9600 baud. SPROG does not echo characters that are sent to it. All commands must be entered on a single line terminated by carriage return. Maximum input line length is 64 characters, including carriage return. Format of parameters is dependent upon the command. The maximum number of parameters on any line is 6.

General Commands

M [n] – Display [Set] operating mode
R – Read mode from EEPROM
S – Display Status
W – Write mode to EEPROM
Z [n] – ZTC Compatibility Mode
? - Display Help
ESC - immediately shutdown power to track

Programmer Commands

C CV [Val] - Read [program] CV using direct bit mode
V CV [Val] - Read [program] CV using paged mode

Rolling Road Tester Commands

A [n] – Display [Set] Address
O byte [byte] [byte] [byte] - Output bytes as DCC packet.
+ - Track power on
- - Track power off
<[step | <] - Reverse speed step[s]
>[step | >] - Forward speed step[s]

Bootloader Command

B a b c – Start Bootloader

Input Format

Input values are always parsed as decimal, unless overridden with 'b' or 'h' prefix for binary or hexadecimal, respectively. E.g. h15 is equivalent to 21 decimal. The O command is an exception to this rule.

Acknowledgement Messages

CV values are given in hexadecimal.

Message	Meaning
!O	Overload
!E	Error
No-ack	No acknowledge pulse received during programming
OK	Programming operation completed

The Mode Word

The “Mode Word” determines the operational mode of SPROG. If the mode is changed, the new mode may be stored permanently in EEPROM memory. The Mode Word is read from the EEPROM each time the SPROG powers up.

The Mode Word is a 16 bit binary value, with each bit corresponding to a particular feature, as shown in the table.

Bit	Name	Feature
0	UNLOCK	Unlock the firmware ready to receive an update via the bootloader. This bit is not stored in EEPROM and is cleared each time SPROG is reset
1	Reserved	SPROG II echoes all received characters if this bit is set
2	Reserved	Do not use, always set to 0 for future compatibility
3	CALC_ERROR	Set to calculate error byte for O command. If clear then error byte must be supplied on the command line
4	RR_MODE	Set for rolling road/test mode
5	ZTC_MODE	SPROG II uses modified DCC timing for older ZTC decoders
6	BLUELINE	Modify direct mode programming algorithm to suit Blueline decoders
7	Reserved	Do not use, always set to 0 for future compatibility
8	DIR	Direction for rolling road/test mode and booster mode. Set for reverse

9	SP14	Select 14 speed step mode for rolling road/test mode and booster mode.
10	SP28	Select 28 speed step mode for rolling road/test mode and booster mode.
11	SP128	Select 128 speed step mode for rolling road/test mode and booster mode.
12	LONG	Use long addresses in rolling road/test mode and booster mode
13-15	Reserved	Do not use, always set to 0 for future compatibility

Commands in Detail

M - Display Mode Word

Display the current mode word value.

M n - Set Mode Word

Set the Mode Word with the value n.

R – Read Mode from EEPROM

Read a previously saved mode word from EEPROM.

S – Display Status

Display SPROG II status - TBD

W – Write Mode to EEPROM

Write the current mode word to EEPROM.

Z [n] – ZTC Compatibility Mode

Some older ZTC decoders (e.g. ZTC401) require modified DCC timing.

Z 0 – return to normal DCC timing

Z 1 – Enable ZTC compatibility mode.

This command manipulates the ZTC_MODE bit of the mode word.

? - Display Help

Displays the SPROG II firmware version, e.g.:

SPROG II USB Ver 2.4

>

ESC - Shutdown

DCC output is turned off immediately.

Programmer Commands

C cv - Read a CV using direct bit mode

C cv val - Program a CV using direct bit mode

V cv - Read a CV using paged mode

V cv val - Program a CV using paged mode

If no val value is given, then these command read the specified CV and display the value in hexadecimal.

If val is given then it is written to the CV.

Rolling Road Tester Commands

A – Display Address

A n – Set Address

Display or set the decoder address (decimal) to be used in speed/direction packets. If a new address is set then current speed step will be reset to zero. This command does not perform any programming of decoder CVs.

O byte [byte] [byte] [byte] - Output bytes as DCC packet.

Any arbitrary DCC packet may be generated using this command. SPROG II will add the correct pre-amble bits, start bits, and error byte. Note that all address and data bytes and, optionally, the error byte must be given on the command line, this command does not use the address set by the 'A' command. If the mode word CALC_ERROR bit is set then SPROG II will calculate the correct error byte which must not be given on the command line. If CALC_ERROR is not set then the error byte must be given on the command line, allowing erroneous packets to be generated for decoder testing.

! Unlike other commands, bytes must be given as two hex digits *without* a h prefix.

+ - Track power on

Turn on track power and check for overload condition after 100ms. When there is no DCC data being transmitted, DCC pre-amble will be transmitted.

- - Track power off

Turn off track power.

<<[<] - Reduce/Reverse speed step[s]

>>[>] - Increase/Forward speed step[s]

Adjust speed step relative to current speed. If decoder is running in reverse then Reduce/Reverse will increase the reverse speed and Increase/Forward will decrease the reverse speed. If decoder is running forward then Reduce/Reverse will decrease the forward speed and Increase/Forward will increase the forward speed. Increment or decrement is determined by the number of '<' or '>' characters in the command. Speed will not increment/decrement past maximum forward or reverse speed step nor through zero. The current speed step will be reported after performing this command:

< – display Reverse speed step

< step – Set Reverse speed step

> - display Forward speed step

> step – Set Forward speed step

Set forward or reverse speed step directly.

Bootloader Command

B a b c – Start Bootloader

Exactly three arguments, a, b, c, must be given with the B command but their values are not checked. This helps prevent inadvertent issuing of the b command. The B commands starts the bootloader ready to receive updated SPROG II firmware. In addition, the firmware must be unlocked by setting the unlock bit of the Mode Word.

Troubleshooting

Before reporting any problems please check the SPROG II homepage for any bug reports or updates. There is a SPROG II FAQ page which will be updated to reflect the most common questions people have about SPROG.

One common problem is the configuration of the “Virtual COM Port” for USB SPROGs. Please review the information in the section “Edit DecoderPro Preferences”

If you are experiencing intermittent faults with your SPROG, please ensure that you are using a DC, regulated power supply.

If you have problems with programming a decoder, or operating DecoderPro throttles, for instance, please use the SPROG console (found under the SPROG menu in DecoderPro), recreate the problem and send the output of the command monitor to sprog@sprog-dcc.co.uk or (for North American customers) sprog@comcast.net with a description of the problem.

Useful Links

SPROG homepage <http://www.sprog-dcc.co.uk> for the latest information, updates, downloads, etc., for SPROG II.

North American distributor for SPROG II <http://www.bbmgroup.com/sprog>

SPROG DCC Yahoo group <http://groups.yahoo.com/group/sprog-dcc> for latest news and discussion of DecoderPro.

Java Model railroad Interface <http://jmri.sourceforge.net> for DecoderPro.

JMRI Yahoo group <http://groups.yahoo.com/group/jmriusers> for latest news and discussion of DecoderPro.

Sun Microsystems <http://java.sun.com> to download the Java programming language JRE required by DecoderPro.